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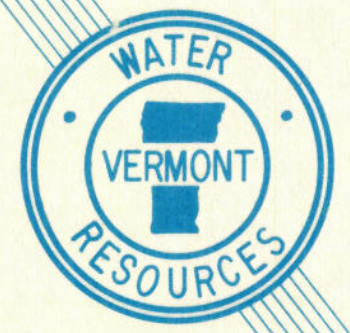
AGENCY OF ENVIRONMENTAL CONSERVATION

DEPARTMENT OF WATER RESOURCES

WATER QUALITY DIVISION



prepared by
Vermont
Department
of
Water
Resources
Montpelier, Vt.

State of Vermont

AGENCY OF ENVIRONMENTAL CONSERVATION

Montpelier, Vermont 05602
OFFICE OF THE SECRETARY

Department of Fish and Game
Department of Forests, Parks, and Recreation
Department of Water Resources
Division of Environmental Engineering
Division of Environmental Protection
Natural Resources Conservation Council

June 7, 1979

Mr. William R. Adams, Jr., Regional Administrator
Region I
U. S. Environmental Protection Agency
JFK Federal Building
Boston, Massachusetts 02203

Dear Mr. Adams: / B-11

This is to forward a copy of the Phase I 208 Vermont Initial Water Quality Management Plan. This report contains the outputs outlined by letter of Reginald LaRosa, dated November 30, 1978, which you acknowledged by letter dated January 12, 1979. The report reflects the step-wise approach to the water quality planning proposed by me (letter dated June 21, 1978) and accepted by letter of Donald Smith dated July 10, 1978.

In this submittal you will find descriptions of implementation accomplished to date along with a schedule of proposed future actions to carry out each plan element. Further schedules for completion of on-going work and implementation of plan elements are also detailed in the FY 1978 Phase II work plan (waste-load allocation, agricultural erosion control, silvicultural erosion control, and backroads erosion control).

The publication of the water quality management regulations enables us to move forward with the necessary restructuring of the 208 Program within our Agency. We expect to provide you with the proposed outline of such changes shortly.

As chairman of the Vermont 208 Water Quality Management Board, I am pleased to report that the 208 process has made significant contributions to Vermont's water pollution control effort. The 208 planning process is now essentially an organic part of the State Water Pollution Control Program. Because of this and as a result of the 208 Board's interest in coordinating its actions with this Agency's priorities, I believe we are increasing our capacity to systematically and effectively resolve the state's water pollution problems.

Sincerely,

B11

Brendan J. Whittaker
Secretary

BJW:SCS

VERMONT INITIAL STATE

WATER QUALITY MANAGEMENT PLAN

June 1979

VERMONT AGENCY OF ENVIRONMENTAL CONSERVATION

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ACKNOWLEDGEMENTS

The Vermont 208 Statewide Waste Treatment Management Planning Board and the Agency of Environmental Conservation are indebted to the many individuals and organizations who made contributions to the Phase I (1976-1979) Vermont 208 Program.

Special recognition is due to Arthur Stone who, as vice-chairman, tirelessly provided the Vermont 208 Board with leadership and thoughtful guidance. Albert White and the Windham County District II 208 Committee membership also deserve special acknowledgement for taking time regularly from their busy schedules to advise the 208 Board and project consultants throughout the two-and-a-half year Phase I planning period.

The high level of public involvement in the 208 program could not have been achieved were it not for the willingness of all members of the District, Agricultural, Forestry, and Technical Advisory committees to contribute freely of their time and ideas. Participation by the public was greatly facilitated by the Vermont Regional Planning and Development Commissions in assisting local district committees.

The following organizations contributed to the Phase I Vermont 208 Program.

Agency of Environmental Conservation
Environmental Engineering, Division of
Water Resources, Department of
Bennington Regional Planning Commission
Burlington, City of
Central Vermont Regional Planning Commission
Franklin County Natural Resources Conservation District
Franklin/Grand Isle Regional Planning Commission
Lake Champlain Basin Study
League of Women Voters
Ottauquechee Regional Planning Commission
Rutland County Regional Planning Commission
St. Michael's College
Soil Conservation Service
State Planning Office
University of Vermont Extension Service
University of Vermont Water Resources Research Center
Vermont ETV
Vermont Natural Resources Council
White River Natural Resources Conservation District
Windham County Natural Resources Conservation District
Windham Regional Planning and Development Commission
Winooski Natural Resources Conservation District

COMMITTEE MEMBERSHIPS

Vermont State 208 Board members:

Buzzell, Timothy	Sharon
Croft, Orman	Swanton
Darrow, William	Commissioner of Agriculture
Farnsworth, Robert	Windsor
Flannery, Mrs. Alice	Norwich
Kuehn, William	Fair Haven
LaPrade, W. Byrd	Manchester Center
Martinez, William	Proctor
Merrill, Henry	Greensboro
Paquette, Gordon	Burlington
Rich, Charles	St. Albans
Schroeder, Mark	Belvidere
Seeley, Winston S.	Middlebury
Simson, John	Development & Community Affairs
Spangler, Carl	Housing & Community Affairs
Spencer, Thomas	Vergennes
Spilak, George	Department of Highways
Stone, Arthur	Williamstown
Stowe, William	St. Johnsbury
White, Albert	Bellows Falls
Whittaker, Brendan J.	Secretary, Agency of Environmental Conservation
Zecher, I. Stanford	Manchester Center

208 District Committee Chairman

District I	John Vihinen	Rutland
District II	Albert White	Bellows Falls
District III	Sherwood Reed	Norwich
District IV	Justin Brande	Cornwall
District V	Glenn Sulham	Barre
District VI	Carlton Ferguson	Fairfield
District VII	Henry Merrill	Greensboro
District VIII	George Novotny	Arlington

Forestry Runoff Committee

Edgerton, Barry	Rutland
Foulds, Raymond T.	Burlington
Hoffman, Robert	East Calais
John, Dr. Hugo	Burlington
Meyer, Hugo	Woodbury
Lapping, Mark	Burlington
Schultz, Gary	Department of Water Resources
Snyder, Jack	Randolph
Stone, Brian	Department of Forests, Parks & Recreation
Wood, Robert	Woodstock

Agriculture Run-off Committee members:

Barrup, Rodney	Derby Line
Chamberlain, Rupert	Barton
Darrow, William	Commissioner of Agriculture
Dupuis, Henry	Quechee
Foster, George	Middlebury
Grant, Howard	Vergennes
Hall, John	East Montpelier
Heald, A. F.	Burlington
Howrigan, Francis	Fairfield
Lawrence Alvin,	South Shaftsbury
Moore, Dick	Springfield
Moore, Don	Cuttingsville
Shaw, Robert	Burlington
Stryker, Barry	Montpelier

OVERVIEW

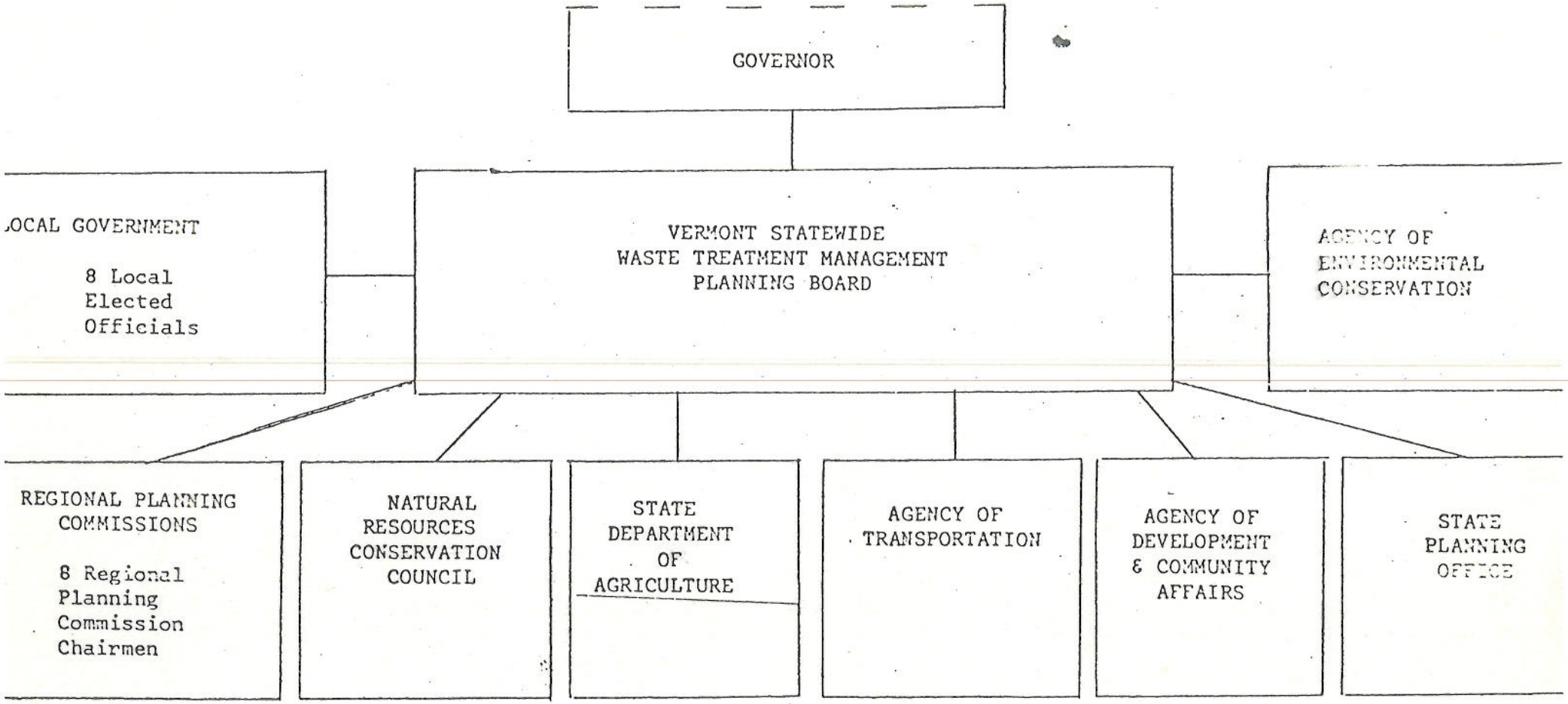
History of the 208 Program in Vermont

Vermont takes pride in the protection the state affords its environment. Due to this philosophy, the state initially chose not to become involved in water quality planning as required by Section 208 of PL 92-500. On February 15, 1974, Governor Thomas Salmon, in accordance with provisions of the law, chose to "non-designate" the state in the belief that existing programs were effectively being used to meet the state's goals for water quality.

Due to subsequent interpretations by the federal courts of Section 208, and enthusiastic responses from regional planning commissions, Governor Salmon chose to re-evaluate his original position. In April of 1976, the Governor designated the entire state as the 208 Planning Area, and asked the U. S. Environmental Protection Agency for the sum of $5,282,424 in order to implement the 208 program. In response, on June 8, 1976, John McGlennon, Regional Administrator, Region I, U. S. Environmental Protection Agency, approved an areawide waste treatment management planning grant for the sum of $411,000.

208 Water Quality Management Board

Vermont has chosen an approach to water quality management planning under Section 208 of PL 92-500 that involves those representatives of regional, local, and state agencies who will implement the recommendations of the State Water Quality Plan (Fig. 1, page v). Persons to comprise a 22-member Water Quality Management Planning Board were carefully selected to represent all levels of government and were then appointed by the Governor. There are representatives from eight regional planning commissions and eight local governments evenly distributed throughout the state according to population. There is a representative from the State Natural Resources Conservation Council, a group tied closely to the agricultural community of the state. In addition, key individuals from the following state agencies are involved: Agency of Environmental Conservation,



STRUCTURE:

- 22 Members
- 1 Vote per Member
- Secretary of Environmental Conservation Serves as Chairman
- The 8 State Administrative Districts Establish the Basis for Local Government and Regional Planning Representation

POWERS AND DUTIES:

- Prepare and Adopt a Statewide Waste Treatment Management Plan in Cooperation with Local Government
- Coordinate Planning Activities among the 8 Areawide Waste Treatment Planning Committees
- Establish Policies for Carrying out the Planning Program
- Develop a Public Participation Program to Involve Citizens in the Planning Process

Figure 1 - State 208 Board

Development and Community Affairs, Transportation, Agriculture, and the Office of State Planning.

The State 208 Board sets planning policies, priorities and responsibilities, and allocates financial resources in the development of the outputs as specified in the 208 Program Work Control Plan. The final product of the 208 effort is a series of elements of the State Water Quality Management Plan. This document summarizes the initial planning completed as of June 1979 and is so titled "Vermont Initial State Water Quality Plan".

Concept of a State Water Quality Management Plan

The description of and requirements as to what constitutes a State Water Quality Management Plan is set forth in Sections 131.10 and 131.11 of the EPA regulations. However, in a memorandum from Region I, EPA, dated March 23, 1976, states involved in 208 planning were urged,

> "...not to spread the current 208 funds uniformly across the remaining areas resulting in generalized plans of little or no value. We recommend that the funds be used to develop detailed evaluations in critical areas which can then be implemented."

With the limited funds available, the 208 Board approved funding for the projects (See Project Bibliography on page 63) which led to the development and partial implementation of the Water Quality Plan Elements presented in this Initial State Water Quality Management Plan.

Procedures for 208 Project Selection

Project selection was a thorough and lengthy process. Prior to the state board approving projects for inclusion in a 208 work program, at least seven distinct steps were undertaken.

A. District Committee Briefing. In his Executive Order of April 15, 1976, Governor Salmon charged the State 208 Board with creating eight district committees; (one for each administrative district, Figure 2), for the purpose of examining the water quality problems in their districts and making recommendations for their solution to the State 208 Board (Figure 3).

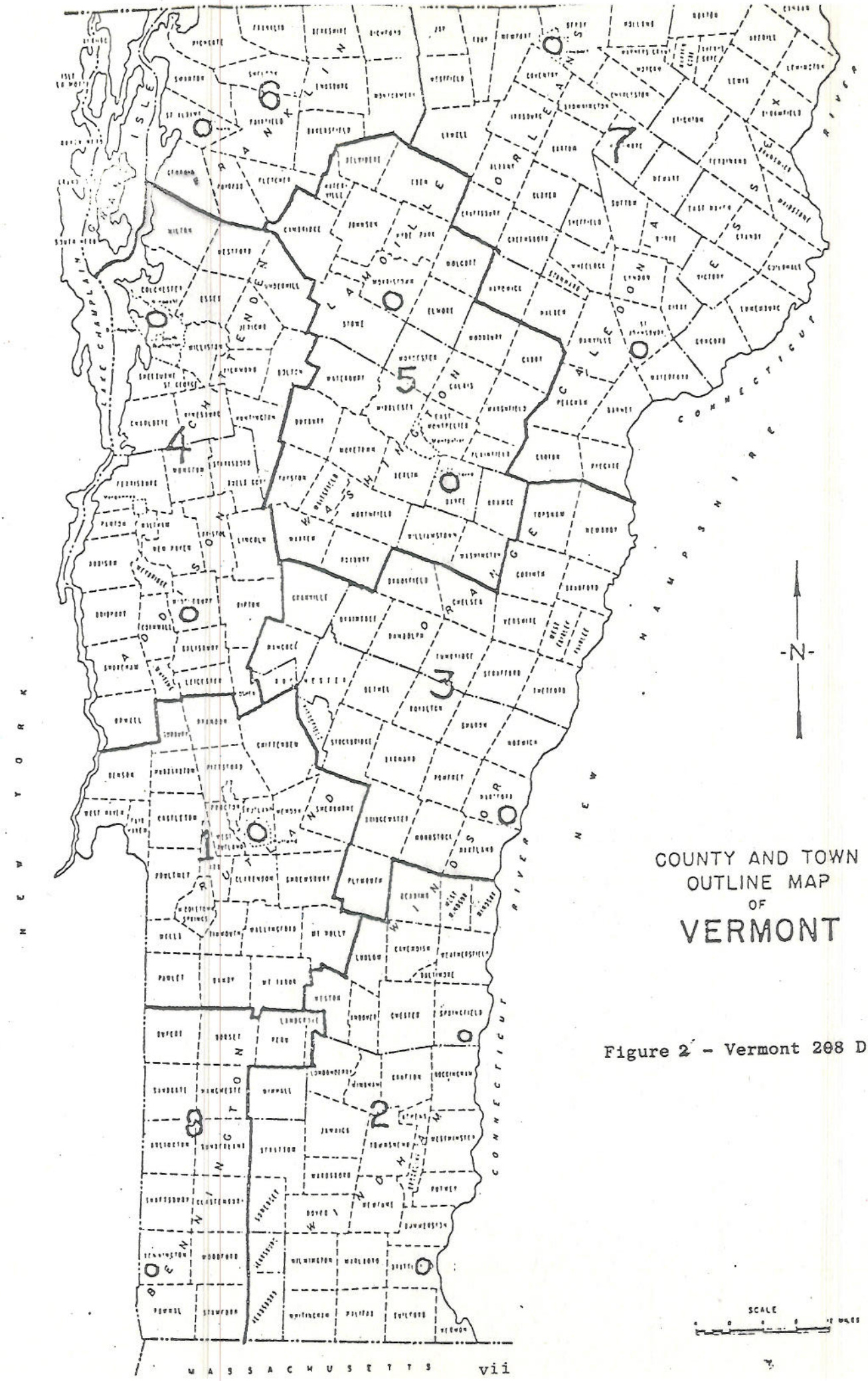
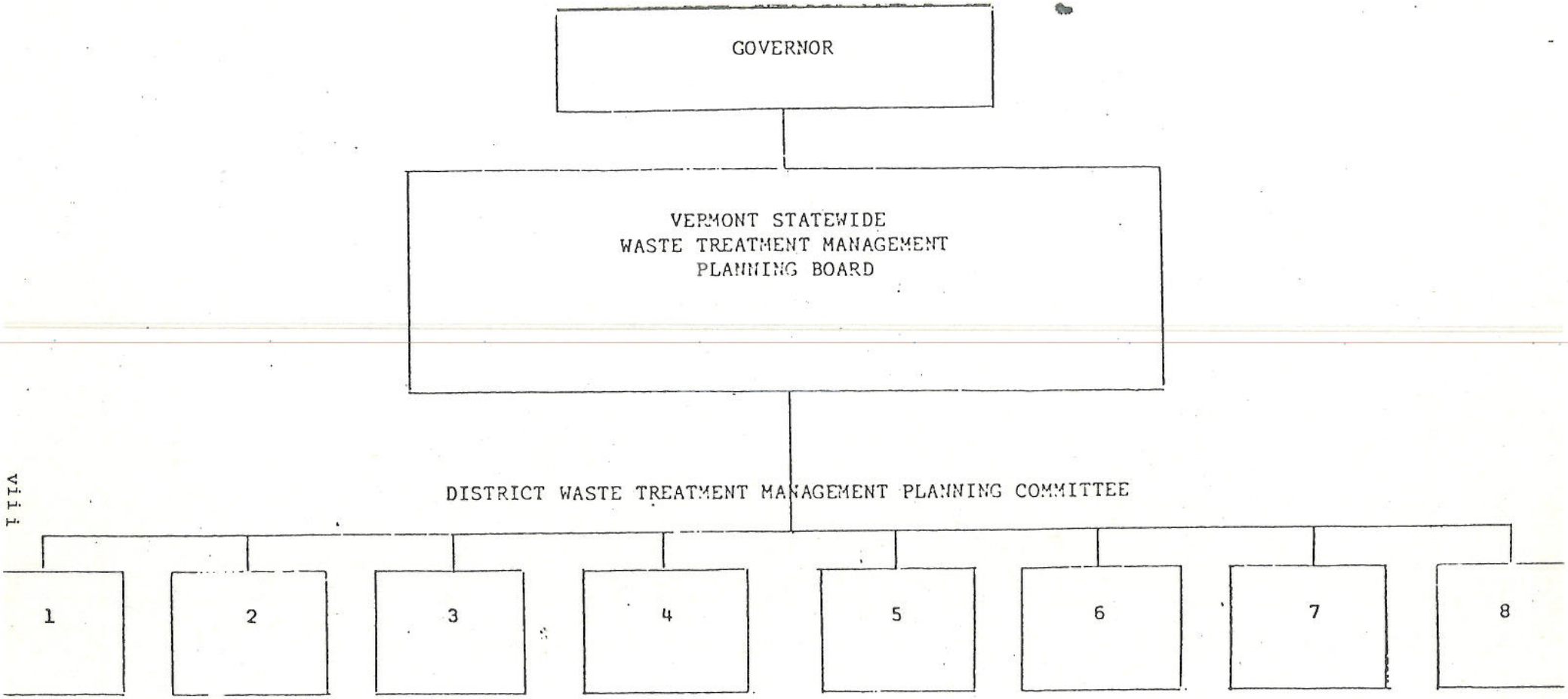


Figure 2 - Vermont 208 Distric



District Committee Members:

- Local Government
- Regional Planning Commissions
- Conservation Districts
- State Agencies
- Other

District Committee Functions:

- Functions to be Determined by the State Board
- Possible Planning Tasks Include
  - Population, Economic and Land Use Projections
  - Public Participation Activities

Figure 3 - Relationship between 208 District Committees and the State 208 Board

Prior to asking the district committees to identify water quality problems, the Department of Water Resources staff and members of the 208 Executive Committee attended district meetings in order to outline the purpose of 208 planning, the functions of the district committees, and water quality problems identified in the district during 303(e) Phase I River Basin Planning. These briefings took place during the week of October 12, 1976.

B. District Identification of Water Quality Problems.

At the next series of meetings, district committees were asked to identify the water quality problems within their district. Committee members, aware that the purpose of the identification of problems and the subsequent ranking of these problems was to aid the State 208 Board in determining the priorities for 208 funding, participated in this process. The composite ranking of all district committees' water quality priorities was as follows:

1. Sedimentation and erosion
2. Lake eutrophication
3. Sludge and septage
4. Assimilative capacity
5. Combined sewer overflow
6. Alternative sewage systems
7. Groundwater contamination

C. State 208 Board Ranking of Priorities.

Prior to the November 16, 1976, State Board Meeting, the 208 staff reviewed the district priority rankings and prepared a position paper on each water quality problem identified. This position paper gave the State Board a basis for determining what priorities should be considered for 208 funding.

After reviewing the 208 staff's position paper at the November 16th board meeting, the State Board voted that elements for 208 funding be considered in the following order.

1. Sedimentation and erosion
2. Alternatives to sewers
3. Sludge and septage disposal
4. Lake eutrophication
5. Assimilative capacity
6. Combined sewers
7. Groundwater contamination

The State 208 Board then asked the 208 staff to develop projects under each of the major headings for review by the Board.

D. District Needs vs. State Board Priorities.

As previously mentioned, the district committees were formed by the 208 Board to advise the Board on water quality problems within each district and to recommend practical and implementable solutions. The Board recognized that for the program to involve the public 208 related work should, whenever possible, take place within each district. The results of the work was to be transferable statewide. Thus, during the week of December 1 through December 6, the 208 staff again met with each committee in order to identify a specific water quality problem which the committee would like to have solved within its district. The meetings allowed the district committees to again review the priorities they established at their previous meetings.

E. Request for Proposals. The concerns that evolved from the district committee meetings were then translated into project descriptions. The 208 staff identified what was needed in order to solve a specific water quality problem.

After reviewing the specific concerns of the districts with water quality and environmental engineering personnel within the Agency of Environmental Conservation, the 208 staff drafted requests for proposals which were sent to 13 regional planning commissions, three universities, two state agencies or governmental units, and two non-profit public interest groups during the week of December 27. The consultants were asked to respond to the request for proposal form that outlined a specific water quality problem. They were asked to outline the procedure that they would use to solve the problem. Along with the request for proposal form was a list of ten criteria that would be used in evaluating proposals. The three most significant criteria were that the proposals should have an element of public participation, lead to the solution of a water quality problem, and lead to the establishment of a best management plan.

F. Completed Proposals.

Proposals received totaled $1,012,117, while 208 funds available for work projects totaled only $242,000. As a first step, proposals were sent to the following agencies for technical review: State Planning Office, Agency of Environmental Conservation (Water Quality Division and Environmental Engineering Division), Department of Health, and researchers at the University of Vermont. Seventeen reviewers evaluated the technical feasibility of individual proposals for 208 funding.

G. State 208 Board Consideration of Work Tasks.

As a result of technical reviews, the 208 staff recommended to the full Board those tasks that they felt should be considered for 208 funding. Included in this recommendation were those projects identified by the Agricultural Runoff Committee, a special committee appointed by the Board. The subjects identified in this work control plan were approved for funding at the January 27, 1977, meeting of the State Board. The responsibility for identifying consultants was delegated to the Executive Committee of the 208 Board.

STATE CERTIFIED PLAN ELEMENTS

This chapter summarizes the five principal plan elements of the Phase I 208 Program. Two elements have been certified by the Governor. Two additional elements have been approved by the 208 Board and by the Agency of Environmental Conservation and have been reviewed by the public. These elements are on the Governor's desk for certification. A final element on on-site wastewater disposal has been drafted and is presently in final review within the Agency of Environmental Conservation. The highlights of each plan element are outlined below. The actions taken to implement these plans appear in the section "Review of Implementation Accomplished".

AGRICULTURAL RUNOFF

Background

Historically agriculture has been important to Vermont's development. In the 1840s Vermont was the second leading producer of wool in the United States. Today, dairy farming and a wide variety of other agricultural land uses, occupy a place in the hearts and minds of many a Vermonter and visitor to the state. It is against this historical background that the Vermont Agency of Environmental Conservation undertook 208 planning, to identify sources of and methods to control water quality degradation from agricultural activities.

In developing a procedure to assess the extent of and methods to control agricultural runoff problems, the Secretary of the Vermont Agency of Environmental Conservation appointed a 208 Agricultural Runoff Committee, chaired by the Deputy Commissioner of Agriculture. The committee convened periodically over a one-and-a-half year period to review research on agricultural non-point source pollution and to suggest methods to control any pollution problems so identified.

Problem Assessment

A number of studies were initiated in an effort to assess the impacts of agriculture on water quality. These studies included a literature review and an on-site field survey of three Vermont river basins (Winooski, Lamoille, and Black). The major findings included the following.

- Erosion and Sediment
  Soil loss appears to be a major problem on farms in the Winooski floodplain and along river banks. Flooding deposits sediment in the floodplain as well. The literature cites soil movement as the primary transport mechanism for phosphorus and a major factor in worsening the impact of other farm practices. Erosion also removes topsoil that is important for agricultural production. Phosphorus export from watersheds of similar land use varies with geologic parent material and associated soil types.

- Cropping Practices
  Runoff from continuous row crops with minimum cover and lacking conservation practices (such as stripcropping, contour tillage, grassed buffer strips, etc.) creates substantially higher soil and nutrient losses than losses from continuous cornfields managed under improved practices, and from losses under drop rotation with improved practices.

- Commercial Fertilizer Application
  Commercial fertilizer is used on pasture, cornland, and hayland. When application rates exceed the rate at which plants can use the fertilizer, the pollution potential is high.

- Animal Waste Management
  Animal manure handling is suspected to be a major contributor to river pollution. A major practice of concern is the piling and spreading of dairy manures on frozen and snow-covered fields, especially those close to waterways.

- Pesticides Application
  Pesticides used locally include Carbaryl (Sevin), Diazinon, Malathion, Atrazine, Lasso, Butyrac, Premerge, and 2,4-D. Locally, applications are sprayed or dusted by equipment or ground or in the air. Pesticide losses are closely tied to quantity and timing of precipitation and flooding in the basin.

Management Plan for Agriculture

Due to economic changes such as market locations, efficiency of scale, and costs associated with meeting health standards (bulk milk tanks, etc.), many farms have gone out of production over the past 20 years. The 208 agricultural committee was, therefore, concerned that regulations not be indiscriminately promulgated which would create an undue financial burden on farmers. The committee recognized

that the impact of creating higher production costs (which cannot be passed on to the consumer by the farmer due to price supports via milk market regulations) could force many farms out of operation. The conversion of farmland to other uses could create greater environmental problems than non-point source pollution.

The bias in favor of non regulation by the 208 agricultural committee does not accept the fact that there may be non-point source problems associated with agricultural land use. On the contrary, the committee is using a pragmatic approach by trying to stipulate where existing programs can best be used, and where new federal funds for non-point source cost-sharing should be applied to benefit water quality the most. The Vermont plan for agriculture consists of the following elements.

1. Cost Sharing Assistance

Amendments to the 1972 Federal Water Pollution Control Act stipulate there can be cost sharing for long-term (5 to 10 years) conservation practices to control non-point water pollution. The steps listed below must be taken to implement this law.

a. Identification of Areas - Areas having the most significant non-point source water quality problems must be designated. This designation must be based upon critical water quality problem areas. A procedure must be established to designate areas.

The 208 agricultural committee asked the State Department of Water Resources to submit a recommendation of those areas that should be eligible for cost-share assistance. The Department and the 208 agricultural committee accepted those hydrologic units listed in Table 1.

Table 1

Priorities for Cost Sharing

Priority for Funding	Hydrologic Unit	Drainage Area Size
1	St. Albans Bay Drainage Area	48,000 acres
2	Black River (Northern) Drainage Area	85,000 acres
3	Shelburne Bay Drainage Area	34,000 acres
4	Lake Carmi 11.2 sq.mi.area, Lake Parker 8.1 sq.mi.Drainage Area	12,352 acres
5	Otter Creek Drainage Area	599,040 acres
6	Winooski Drainage Area	691,200 acres
7	Barton River Drainage Area	111,360 acres
8	Lamoille River Drainage Area	451,840 acres

The priorities are based upon what is considered to be the most serious non-point source problem from phosphorus input to the lakes.

b. Priority of Problems - Sources contributing to water quality degradation must be identified. Once identified, a procedure should be developed to rank practices designed to eliminate these sources. The ranking is for priority of cost-sharing assistance.

The best management practices listed in Table 2 below are those that the 208 agricultural committee considers will lead to the reduction of non-point water pollution problems from agricultural operations.

Table 2

CONSERVATION PRACTICES TO BE COST SHARED

Conservation Cropping System	Pasture and Hayland Management
Contour Farming	Pasture and Hayland Planting
Cover and Green Manure Crop	Stream Channel Stabilization
Critical Area Planting	Streambank Protection
Diversion	Stripcropping
Filter Strip	Waste Management System
Grassed Waterway or Outlet	Waste Storage Pond
Trough or Tank	Waste Storage Structure
Livestock Exclusion	Waste Treatment Lagoon
Minimum Tillage	Waste Utilization
Mulching	

These are the only practices that will be considered for Rural Clean Water Program cost sharing in Vermont.

c. Administrative Structure - The cost share assistance will be based on the existence of a State Water Quality Management Plan. A management agency must be designated in the plan to be responsible for non-point agricultural pollution. This agency will be responsible for certifying cost-share funding.

The 208 agricultural committee recommended that the State Natural Resources Conservation Council be designated the management agency and local administering agency for agricultural non-point source pollution control.

The duties of the Council, as the state administrative agency, are as follows.

- Prepare, with the assistance of the State Coordinating Committee, rural water quality funding requests for submission by the Governor to the Secretary of Agriculture
- Guarantee an adequate level of participation in the program by rural landowners in the designated area.
- Certify that the cost sharing is for solving the most critical problem practices from a water quality perspective
- Establish agency agreements (if appropriate) for the accomplishment of program objectives.
- Evaluate the cost-sharing program for effectiveness.
- Enter into contracts and distribute funds to contractors.

In administering the program, the Natural Resources Conservation Council may, depending upon regulations, delegate duties to and/or seek assistance from the following agencies listed in Table 3.

The Council, as the state administrative agency, will be expected to coordinate its activities with the federally-designated State Coordinating Committee. This is easily accomplished as the chairman of the federally-mandated committee, the SCS State Conservationist, is an advisory member to the State Council.

Table 3

Recommended Roles for Agencies

x Primary Responsibility
s Supporting Role

Program Activities	Water Resources Department	Natural Res. Cons. Council	Conservation Districts	SCS	ASCS County Committee	Extension Service
Identify areas (hydrologic) eligible for funding	x	s	s	s	s	
Submit Funding Request to Governor for submission to USDA	s	x		s		
Contact Farmers		x	s	s	s	s
Guarantee Participation		x	s			
Establish Individual Priorities			x		x	
Prepare Plan			x			
Certify Practices		x				
Disburse Funds based on certified plan					x	
Develop Educational Program			s	s	s	x
Evaluate Program	s	x	s	s	s	

d. Program evaluation - The program should be evaluated to determine if non-point source impacts are being reduced through the implementation of best management practices.

The land use evaluation of practices is the responsibility of the management agency. However, the State Council does not have the financial resources or the personnel to carry out water quality monitoring of the basins recommended for cost-share assistance. The agricultural runoff committee recommended that the land use evaluation be coordinated with water quality monitoring so that the effectiveness of BMP's can be evaluated. There should be a continuous water quality monitoring program in the basin (drainage area) designated for non-point funding. Such a monitoring program can be carried out by the State Department of Water Resources or University Research Centers. Additional federal funding will have to be made available for such an evaluation as it is understood that Rural Clean Water Program funds cannot be used for that purpose.

2. Conservation Planning

Cost sharing through the Rural Clean Water Program does not apply to the entire State of Vermont. Only eight priority areas have been designated for funding. As the 208 agricultural committee is concerned that a greater effort be made to ensure conservation planning and the implementation of conservation practices on all rural farmland, the following recommendations were made by the committee.

a. All agencies that work with the rural landowner on conservation planning should ensure that the conservation plan include methods to control non-point source pollution associated with soil erosion and manure storage and handling.

b. All active farmers should have conservation plans approved by local Natural Resources Conservation District Board of Supervisors. Existing conservation plans should be revised on a priority basis. Those farms with immediate non-point source problems should be updated first.

c. Additional state and/or federal assistance should be provided for technical assistance and cost sharing to aid in conservation planning and the installation of conservation practices.

d. The ASCS County Committee and the Natural Resources Conservation District will establish priorities for cost-share assistance based upon the recognition that eroded soil material and manure wastes are the most significant contributors to agricultural

non-point source pollution. Funding assistance should be based on the extent to which individual farm priorities reduce erosion and prevent waste pollution.

The above recommendations are significant. Currently there are 8,000 Vermont conservation plans and there is a need for an additional 4,500 plans (this includes revisions to existing plans). Without additional staff and state and/or federal funding, the Soil Conservation Service estimates that it would take 45 years before all farmers would have conservation plans. Thus, recommendation "b" above states that conservation planning should be done on a priority basis. Those farmers with the most-serious non-point problem should be those who receive conservation planning assistance. In addition, ASCS funding assistance must be based upon practices to protect water quality and the determination of what practice to fund will be a joint function of the local ASCS committee and the local Conservation District Board of Supervisors. This latter recommendation is a significant change from past procedures where funding was based more upon the farmer's priorities which led many times to demands for lime and fertilizer. The implementation of these recommendations may require direction from the State Conservationist and the Executive Director of the State ASCS Committee.

3. Education

The major premise on which this plan is written is that education should be the first method used to bring about pollution control from agricultural activities. It should be noted that a mechanism already exists for delivering educational services. In Vermont this organization is the University of Vermont Extension Service.

Education by itself is known not to be a quick remedy to a problem. It may take many years and many generations to gain acceptance of a new idea. The County Agent has been performing this educational task for generations and the success of this approach can be seen in the new concepts and ideas adopted by the farmers.

In 1977, the University of Vermont Extension Service hired its first Water Resources Extension Specialist. This individual is based at the university, but is responsible for keeping extension agents aware of water resource issues. Part

of the individual's task is to keep field agents aware of non-point source water pollution facts. Thus, the extension service is placing a greater emphasis on water quality extension education.

4. Research Needs

The 208 Agricultural Runoff Committee was continually perplexed by the inability of the researchers to accurately quantify the impact of non-point source pollution. It should be noted that this problem is universal. In their probe for information, scientists are finding that little is known about linkages between land use and water quality.

Because of the above inabilities, it is recommended that further research be done in Vermont in order to demonstrate to the farming community the relationship between agricultural land use and water quality. In addition, there is always the possibility that EPA will mandate stricter controls for such pollution. Vermont should be prepared to demonstrate to the farming community the impact associated with certain activities and the costs associated with mitigating such impacts.

No cost figure is being developed for such research. It is recognized that such research is expensive. However, it is recommended that such work should be a joint effort among the State of Vermont, the University of Vermont Agricultural Experiment Station, the University of Vermont Water Resources Research Center, and the U. S. Soil Conservation Service.

SEPTAGE MANAGEMENT

Background

Approximately half of Vermont's citizens are served by on-site disposal systems. The proper maintenance of septic systems includes the pumping of septage. This material is usually disposed of at sewage treatment facilities and land sites. The Vermont 208 Board identified septage management as a problem which should be addressed as a part of the State Water Quality Management Plan. Among the reasons behind the Board's interest in this subject were concern about the actual disposal methods used by pumpers, the impact of septage on water quality, the absence of state regulation of septage management, and a desire to make the best use of the nutrients and organic resources in septage.

The Vermont Water Resources Research Center was contracted to carry out a study entitled "Septage Management Strategies for Vermont". Four specific objectives of the project included:

1. To inventory and describe Vermont's septage management problems and to determine the extent of these problems on a statewide basis using existing data.

2. To assess viable technical-economic alternatives for septage management which may be adopted for use in the State of Vermont.

3. To provide the legal perspective which is necessary for the drafting of ordinances and/or legislation of a specific nature relating to septage management.

4. To prepare specific strategies for septage management in three distinctive case study areas of Vermont including rural farm, rural non-farm, and suburbanizing regions.

Problem Assessment

It is estimated that 10 to 20 million gallons of septage are pumped from a portion of the approximately 76,000 septic tanks believed to exist in Vermont. Septage haulers are "left to themselves" to develop local septage disposal practices. Although the locations of many private land sites are not known, it is suspected that some land disposal operations are likely sources of water pollution. In addition, some of the treatment plants which receive septage are

not treating it adequately. Potential water quality problems associated with septage disposal include the following.

- Septage is rich in available ammonia which can be transformed to nitrate in the soil. Nitrate can move through the soil and contaminate both ground and surface waters. Thus, careful consideration must be given to nitrate contamination of groundwater when developing septage management strategies. Septage also has a high biochemical oxygen demand - 25 times greater than that of domestic sewage. If allowed to enter a water body, septage can deplete oxygen and damage desirable aquatic ecosystems. The nitrogen and phosphorus in septage can stimulate weed growth.

- Concentrations of heavy metals are contained in septage and these may be taken up by plants. Plant growth may be inhibited, livestock endangered, or the metals may become a part of food for human consumption. Raw septage also has a highly offensive odor, which, although proving no threat to human health, is nonetheless an important planning consideration.

- With the absence of regulation, it is possible that many materials, including industrial and commercial septage, rendering wastes, holding tank wastes, and chemical toilets may be pumped by the same truck that spreads septage on agricultural cropland.

- Even though septic systems require periodic pumping (3-year period recommended), it is believed that most homeowners wait for septic system malfunction before they have the tank pumped. This results in a high rate of system failure and greater costs to homeowners. With the present emphasis on encouraging more regular maintenance, it is anticipated that the volume of septage pumped and disposed statewide will increase.

- The state's regulations affecting septage management are limited and no codified guidelines for septage management exist. The Vermont legislature has encouraged local governments to accept the responsibility for providing septage disposal sites. (10 VSA Chapter 159). Up to the present time, however, private haulers have borne the responsibility for septage disposal in Vermont. Many haulers have their own sites. In some cases towns receive septage in treatment plants or at land disposal sites. In certain areas where towns have closed land disposal sites, haulers must travel excessive distances and rely on only one or a few disposal sites.

Management Plan for Septage

1. A statewide septage management strategy should be adopted by the State of Vermont as an element of the solid waste management plan required by Title 10 VSA, Chapter 159.

2. The State of Vermont should assign the responsibility for septage management to local units of government.

3. The State of Vermont should adopt "Rules and Regulations for Septage Disposal" to guide the development and operation of septage disposal sites. These regulations should specify the use of both wastewater treatment plants and a variety of land disposal methods. The regulations should specify that hazardous septage of commercial or industrial origin should be disposed of separately from septage of domestic origin.

4. If it is determined that the Solid Waste Management Act of 1977 does not supersede Health Department Regulation Waste Treatment and Disposal (Section 5-890) then this section of the Health Department regulations should be amended to remove the requirement for burial of septage. The amendment should permit burial as well as other land disposal methods such as land spreading or small-scale lagooning, depending on which is locally most appropriate.

5. Existing and planned septage disposal sites, including both wastewater treatment plants and land sites, should be evaluated by the state for compliance with septage disposal regulations.

6. Septage disposal sites found to be in compliance with septage disposal regulations should be certified, approving the site to receive septage of domestic origin only.

7. The State of Vermont should hire a full-time professional to manage the septage program. Responsibilities of this position should include:

(1) educating officials on their responsibilities in the management of septage;
(2) educating officials in local communities on options available to handle septage in their regions:

(3) organizing local communities to enter cooperative agreements to handle septage;
(4) inspecting disposal facilities and sites;
(5) certifying sites;
(6) aiding communities in obtaining necessary technical assistance to obtain site certification; and
(7) administering enforcement, if required.

8. The State of Vermont should encourage local municipalities in obtaining a financial return from the disposal or treatment of septage within their boundaries. Such monies would reimburse towns for initial engineering and cover administration associated with the operation of septage disposal facilities and sites.

9. The state should support a forceful education program concerning septage management to:

a. inform local jurisdictions concerning their responsibility for septage management;
b. inform local jurisdictions concerning the management alternatives available to them;
c. provide homeowners with information concerning proper operation and maintenance of septic systems;
d. provide haulers and disposal site operators with assistance; and
e. train local personnel who may assist in providing technical assistance.

Such an educational program should be conducted through the Extension Service, the Natural Resource Conservation Districts, the League of Cities and Towns, the Regional Planning Commissions, and other appropriate organizations.

10. The State of Vermont should encourage private businessmen to continue to play a vital role in septage management.

11. The State of Vermont should not license haulers although local municipalities may license haulers as part of their administration of state septage disposal regulations.

12. The State of Vermont should develop enabling legislation permitting local municipalities to license haulers.

13. Prior to drafting the final regulations, the Agency of Environmental Conservation should consult the Department of Housing and Community Affairs.

DRAFT PLAN ELEMENTS

FORESTRY RUNOFF

Background

On a per-acre basis, undisturbed forestlands are our best source of high quality water. Due to the increasing demands for timber products, firewood, and wood chips for electrical power generation, Vermont's forests are coming under increasing pressure. While the public seldom sees the damage resulting from careless timber harvesting activities, soil erosion and the resulting sedimentation of streams, lakes, and ponds is a serious potential water quality problem. For this reason, the Vermont 208 Water Quality Management Board identified forestry runoff as a problem to be addressed in the state's Water Quality Management Plan.

Problem Assessment

It is generally recognized that the most important pollutants which result from timber harvesting practices are sediments, nutrients, and increases in water temperature.

- Sediment
  An increase in sediment is the major cause of impaired water quality resulting from logging activities. Soil particles which are washed into streams can have many adverse effects, including increased turbidity, the smothering of aquatic organisms, destruction of spawning habitat by alteration of the stream bottom and the accelerated filling in of lakes and ponds. Bare soil exposed by logging roads, skid trails, and to a lesser extent by log landings, is considered the major source of the soil erosion and sediment created by logging. The problem is due to the lack of applying basic methods to control the overland flow of water from roads and trails which are often poorly planned, constructed, and maintained. The practice of skidding logs in or across streams may also cause significant erosion of the stream channel and its banks. Factors which influence the extent to which eroded sediment can affect water quality include the erodibility of the soil, the slope of the land, the proximity to surface water, the weather, and the vegetative cover.

- Nutrients
  Logging activities usually increase the amount of dissolved and particulate nutrients released from a watershed. The magnitude of the increase is related to the intensity of the harvest, the time of year that harvesting occurs, and the harvesting techniques used. These related nutrients result in changes in the chemical concentration of stream water and cause an increase in the total quantity of

nutrients delivered to lakes and ponds downstream. Nutrient levels in streams are usually highest the first two years after logging, reaching normal levels after four years with the normal regrowth of vegetation. Nutrient increases and phosphorus, in particular, have been shown to be responsible for nuisance aquatic plant growth. Algae blooms and weed beds may subsequently cause a lowering of dissolved oxygen levels as well as taste and odor problems. Nutrient input to streams draining forestland may result from erosion on logging jobs or by the increased amount of groundwater reaching streams in areas which have been intensively cut.

- Temperature Increase

  When trees and shrubs are removed along the banks of a stream, the new exposure to sunlight may cause significant increases in water temperature, especially during periods of low flow. Temperature is a primary regulator of biological activities and an increase in the temperature regime of small streams may adversely impact fish populations by increasing their rate of metabolism while, at the same time, reducing the amount of dissolved oxygen in the water. Elevated water temperatures may, therefore, reduce the vigor of cold water species and make them more susceptible to disease or parasites. Small headwater streams are most likely to be affected by the clearing of stream-site vegetation.

Water pollution resulting from timber harvesting operations in Vermont is not considered to be a major problem at this time, especially when compared to other point and non-point sources. This assessment is based on the judgment of professional foresters, woodsworkers, and enforcement officials who are familiar with the timber harvesting activities in the state. Timber harvesting operations are generally small scale and scattered widely throughout the state. In addition, these water quality problems are generally of short duration. Timber harvesting operations may cause significant localized impacts on water quality and aquatic life, especially in small headwater streams.

A concern for increased water quality problems in the future has resulted from greater demands for wood and the development of new large-scale harvesting technology. The increased use of wood for home heating, the proposed 50-megawatt wood-fired power plant in Burlington, interest in smaller decentralized wood-fired power plants throughout the state, and greater demand for wood products, are all evidence of the increasing public and private interest in wood for energy and materials. The development of new harvesting technologies, especially the whole-tree chipharvester

makes it possible to harvest trees that were formerly left in the woods. Sites which were considered marginal are now being re-evaluated because more trees can be profitably harvested. This machinery, as well as the increased demand for wood that is anticipated, may result in more intensive harvesting of Vermont's forests, and may therefore increase the potential for water quality impacts.

Management Plan for Forestry

The Forestry Runoff Committee recommended and the 208 Board concurred that Vermont's 208 Forestry Plan should emphasize a vigorous educational and informational approach. The specific elements of the proposed Forestry Plan are discussed below.

1. Erosion Control Guidelines Handbook for Loggers and Landowners

A pocket-size booklet of Erosion Control Guidelines has been prepared in cooperation with the Windham County NRCD, UVM Extension Service, USDA Soil Conservation Service, and the Agency of Environmental Conservation. These guidelines include information on the location, layout, and construction of logging roads, skid trails, and log landings; specifications for constructing erosion control devices such as culverts, bridges, and water bars; seeding and mulching information; review of existing laws and regulations affecting logging activity; and a list of resources available for technical assistance. The booklets will be widely distributed throughout the state to both loggers and landowners.

2. Erosion Control Workshops for Loggers and Landowners

Erosion control workshops will be held annually as a means of providing technical information, demonstrations, review of laws and assistance to loggers and woodsworkers. Two workshops are currently planned for the Summer of 1979, one in northern and one in southern Vermont. They will be organized locally as a cooperative effort by county foresters, the forest products industry, the Vermont Timber Truckers and Producers Association, the UVM Extension Service, and water resource investigators. The state will also encourage the development of an erosion control segment to be added to the "Woodcutters Workshops" held in several counties by county foresters and county agricultural extension agents.

3. Education of Loggers through Self-Policing of Logging Jobs by the Forest Industry

The Vermont Timber Truckers and Producers Association (VTTPA), a statewide organization representing loggers, truckers, mill operators, and other individuals in the forest products industry, has volunteered to assist the state in reducing erosion from logging jobs. The VTTPA believes that loggers will be more receptive to both learning and implementing proper erosion control practices when approached and encouraged by members of their industry, as opposed to state enforcement officers. The VTTPA has divided the state into three

regions and elected volunteer committees for each region. When complaints arise on logging jobs, the committees will make on-site visits to the logger and attempt to work out the problem by encouraging the use of appropriate erosion control practices. State enforcement officials will be called in only if this approach fails.

4. Slide-Tape Presentation on Forestry Runoff Problems and Erosion Control Practices

The State of Vermont will promote the use of a slide-tape program developed by the UVM Extension Service. The program provides information on the history of the state's 208 program, effects of timber harvesting activity on water quality, erosion control practice which will minimize the problem, and a review of the 208 Forestry Plan.

5. Use of Media

The UVM Extension Service will take responsibility for utilizing the programming of local television and radio, newspapers, and extension service newsletters to promote a fuller understanding of forestry non-point source pollution issues.

6. Timber Sale Contracts

The Department of Forests, Parks and Recreation will recommend to active consulting foresters, and sellers and buyers of stumpage, that timber sale contracts and/or agreements be amended to include provisions which allow for the incorporation of erosion control guidelines before, during, and after logging.

7. Enforcement of Water Resource Laws and Regulation

Existing state water resource laws and regulations will be used as a mechanism to ensure compliance with the erosion control guidelines in cases where voluntary compliance is unsuccessful.

The 208 Forestry Runoff Committee will evaluate the effectiveness of the Forestry Plan after a two-year period. Topics to be evaluated include the success of the industry's self-policing efforts, the degree to which educational efforts are improving the general quality of logging jobs in the state, and re-evaluation of forestry-related water quality problems. The need for additional regulations will be considered.

ON-SITE WASTEWATER DISPOSAL

Background

When indoor plumbing came into general use during the early 1900s, it brought with it new requirements for the disposal of sanitary wastes. The process of wastewater disposal - which had consisted of relatively simple methods such as privies, dry wells, and discharges to rivers - evolved toward more complex methods requiring advanced technologies. Both population and per capita water use increased and created further demands for treatment techniques capable of handling large volumes of wastewater. Today nearly 50 percent of Vermont's population, or 226,000 people, are served by on-site sewage disposal systems. Despite this increase in both the number and the rate of on-site systems installation, no comprehensive program exists in Vermont for assuring proper installation and maintenance.

Several practical reasons may account for this. First, Vermont statutes place much of the responsibility for on-site wastewater system installation and maintenance regulation with municipalities. While the state administers the subdivision, public building, and mobile home park regulations, the regulation of individual on-site wastewater systems is left mostly up to individual municipalities. The state's primary function is to evaluate local health ordinance regulations for consistency with minimum state standards (although the State Health Commissioner can step in and enforce regulations in the name of the local Board of Health). In many areas of the state, slowly permeable soils, shallow soils, and steep slopes make adequate disposal difficult and costly. To avoid such costs, towns have been reluctant to adopt health regulations which would require installation of expensive systems necessary to overcome site limitations. In addition, some towns have adopted regulations but have not properly enforced them due to a lack of time, interest, resources, or professional expertise. Other towns where there is widespread public interest in using "alternative" wastewater disposal systems, have been reluctant to adopt the model state health regulations which inhibit such alternatives.

These issues prompted the Vermont 208 Water Quality Management Board to sponsor four planning studies concerning on-site systems. The 208 plan for on-site wastewater disposal incorporates the recommendations of these planning studies, the recommendations of a study of institutional arrangements for regulating on-site systems conducted by the Agency Environmental Engineering Division between 1976 and 1978, and the recommendations of an Agency of Environmental Conservation ad hoc advisory committee, charged by the legislature with drafting legislation for a more effective administrative approach to the regulation of on-site wastewater disposal.

Description of Studies

Following meetings in early 1977 with eight 208 district advisory committees a study plan was developed to investigate and attempt to resolve wastewater disposal issues of significance to Vermont communities. One principal criterion used in selecting projects was that the issues be shared by several communities in Vermont. The four principal study objectives were:

(1) to provide better information on wastewater disposal regulations, alternative systems and planning methods to municipal officials,

(2) to determine the rate of septic system failures on slowly permeable soils and collect data to identify which subsurface systems can function adequately on such soils,

(3) to aid in the prevention of septic system failure by locating communities where rapid growth, site limitations, or the pattern of development may result in extensive septic system malfunction, and

(4) to evaluate whether the use of local land use controls in combination with alternative wastewater systems can prevent the need for conventional wastewater treatment facilities and ensure adequate wastewater treatment at a lower cost.

⊕ Water Quality Management Workbook

The Vermont Natural Resources Council was funded to address the first study objective by developing a "water quality management workbook". Book I provides background information for local officials and laymen on sewage technologies and laws relating to on-site wastewater disposal. Book II describes a process by which towns may evaluate their present and future sewage treatment needs and take action to achieve long-term goals. The workbook contains information to aid town officials in evaluating and adopting regulatory programs, in evaluating soils and their capacity to

assimilate waste from residential growth, and in comparing relative costs and in using alternative waste disposal systems. In addition, the workbook outlines land planning methods available to guide growth and the placement of wastewater collection systems.

⊕ On-Site Wastewater Disposal in Slowly Permeable Soils

The White River Natural Resources Conservation District (NRCD) investigated the second study topic. Representatives of the NRCD On-Site Specialist Program, which assists homeowners in the design and installation of septic systems, conducted a questionnaire survey and an on-site field investigation at 330 water-metered homes on slowly permeable soils in Addison County. The study evaluated 43 separate parameters, including system performance, soil type, system age, usage patterns, and regimes of installation and maintenance. Following the questionnaire survey, 40 systems representative of those covered in the questionnaire survey were excavated and monitored in an attempt to correlate physical and chemical parameters with system performance. A high system failure rate led to the conclusion that health regulations should be adopted locally and should be supplemented with high quality technical assistance programs.

⊕ Evaluation of Potential Community Wastewater Treatment Needs

The third objective was examined jointly by Windham County and Southern Windsor County Regional Planning and Development Commissions. The consultants evaluated 87 communities in their regions and cooperated in planning studies for three communities (Bondville, Felchville, and Whitingham) where a high potential on-site system failure rate was found to exist. Study recommendations included revisions to local health ordinances; utilization of the Natural Resources Conservation District's On-Site Specialist Program; development of a maintenance program for septic systems; and revision of zoning by-laws to make certification of proper on-site system installation a condition for obtaining a building permit. In each town, however, the adoption of such recommendations rests in the hands of local officials and the voters.

⊕ Institutional Arrangements for Achieving Community Wastewater Treatment and Planning Objectives

Finally, in response to the fourth objective, the Bennington County Regional Commission investigated sewage treatment systems and institutional arrangements to make a smaller scale than conventional community wastewater disposal system economically viable in Arlington, a typical small Vermont town. The report contains recommendations for a specific alternative wastewater disposal system coupled with supplemental land planning procedures. These recommendations are now under consideration by the town's consulting engineer and by Arlington town officers. The final approach adopted will depend on the desires of the selectmen, town planning commission members, sewer committee members, voters, and approval by state and federal governments.

⊕ State Institutional Arrangements

The 208 Plan for On-Site Wastewater Disposal also contains findings and recommendations of a study performed by the State Environmental Engineering Division of the Agency of Environmental Conservation. This project reviewed and evaluated institutions in Vermont which concern on-site wastewater disposal.

Draft Management Plan for On-Site Wastewater Disposal

The 208 on-site wastewater disposal plan contains recommendations of the consultants and proposes actions to improve regulatory and management programs. The long-term goals of the plan include upgrading on-lot system installation and maintenance to reduce failure, protecting groundwater and reducing the cost for collection and treatment.

The specific actions recommended to achieve these goals include:

(1) establishing a committee to evaluate regulations and to promote research,
(2) developing an educational program for town officials to encourage improved on-site system management,
(3) making administrative changes to increase the effectiveness of programs conducted by the Agency of Environmental Conservation, the Department of Health, and the "On-Site Specialist Program",
(4) increasing the effectiveness of the Conservation District On-Site Program,
(5) preventing the continuation of on lot system failure in towns which construct treatment plants, and
(6) conducting surveys to locate towns where large costs may result from inadequate local health regulations or from insufficient consideration of future waste treatment needs in town plans.

These recommended steps will serve to guide the state in the management of on-site wastewater programs. The plan will also serve to guide the expenditure of funds as they become available for the management of on-lot wastewater treatment and disposal systems.

1. On-Site Wastewater Committee to Promote Action

An on-site wastewater disposal committee shall be established within the Agency of Environmental Conservation (AEC). The committee's membership should represent technical, regulatory, management, local government, private and business interests. The role of the committee will be to make recommendations to the Secretary of the Agency of Environmental Conservation in the following areas:

a. Review and revise health regulations (Vermont Health Regulations, Chapter 5, Subchapter 10, Parts I, II, and III) to increase clarity and uniformity and to develop a comprehensive program to promote long term wastewater system performance through proper site evaluation, system design, installation, and maintenance.

b. Prepare a clear and self-explanatory model health ordinance for municipalities.

c. Conduct a continuing review of state standards and allowed systems and recommend changes as needed.

d. Review regulations and administrative rules concerning sub-divisions and recommend procedures to (a) increase communication between local health officers and administrators of the sub-division program, and (b) to evaluate the need for the submission of specific systems design and for the inspection of systems prior to backfilling.

e. Promote research and experimentation with innovative and alternative systems, review technical advances reported in the literature, and advise the Secretary of the Agency of Environmental Conservation on revisions to the regulations which would allow alternative systems. Alternatives to the Vermont mound system should be encouraged on an experimental basis provided that the alternative can reasonably be expected to meet the performance standards described in the Vermont Health Regulations, Chapter 5, Subchapter 10, Part II. The system would be installed at the homeowner's expense following a local and/or state permit process and would be monitored by state and local health officials. If these systems meet the purposes of the state on-site wastewater disposal regulations when properly designed, constructed, operated and maintained, the Agency of Environmental Conservation shall describe specifications for such systems and promote their incorporation in state regulations. If the alternative system fails, the expense for correction will be the responsibility of the homeowner by prior agreement.

f. Evaluate the effectiveness of programs which use the state standards for on-site systems in site evaluation, and on-site system design, inspection, and maintenance.

g. Suggest regulatory provisions for protecting groundwater.

2. Education of Local Officials, Technicians, and Citizens

The state shall develop an educational program to encourage local municipalities to take responsibility for proper installation and maintenance

of on-site systems. The state should:

a. Through training workshops on on-site wastewater disposal and appropriate printed matter

   (1) encourage towns to adopt septic system ordinances,
   (2) encourage towns to plan development to reduce eventual costs of installing sewers or to eliminate the need for sewers by proper septic system siting, and
   (3) advise citizens on proper methods of wastewater disposal.

b. Distribute and publicize the Water Quality Management Workbook to all Vermont agencies which deal with the public on sewage issues and to community leaders in towns involved with facility planning.

c. Establish a clearinghouse within the Agency of Environmental Conservation on on-site wastewater disposal. The information shall include:

   - literature on available technologies,
   - evaluation of systems effectiveness and the conditions to which they are suitable, and
   - regulations for each alternative system.

3. Single State Management Agency

A single management agency shall be designated to write, adopt, and administer regulations related to all phases of the layout, design, installation, and maintenance of on-site wastewater disposal systems. Since the Agency of Environmental Conservation has a strong technical capability in this field, it shall perform this function.

4. Increase the Effectiveness of the Natural Resources Conservation District On-Site Program

The "Natural Resources Conservation District On-Site Program" provides technical assistance to towns and homeowners in installing septic systems. This program should be expanded throughout the state with the assistance of state funds, provided that:

a. A professional engineer specializing in on-site systems be placed in charge of the technical aspects of the "on-site specialist program" and assure quality control for services performed by technicians.

b. The program provide or arrange maintenance services for

individual on-site systems.

c. Fees obtained for on-site specialist services shall be changed regularly to reflect changes in the overall economy. In addition, the fees should be sufficient to promote continued expansion of the program as necessary to assure proper coverage of the state.

5. Preventing Continuing On-Lot System Failure

The agency shall prepare and promote legislation which amends Title 10, V.S.A., Chapter 55, to require municipalities which receive funding for the construction or modification of wastewater treatment facilities under Section 201 of PL 92-500 to have adopted a health ordinance governing the proper installation of individual on-site systems. An ordinance must be at least as stringent as the existing recommended minimum state standards for site evaluation, on-site system design, installation, and maintenance. The legislation will also require the municipality to demonstrate that it has an adequate technical and administrative program to assure compliance with the municipal on-site ordinance.

6. Wastewater Surveys and Sewer Avoidance Planning

The state shall conduct a survey to locate towns which have a high predicted on-lot system failure rate as a result of rapid growth, soils limitations, or improper local on-site system regulations. Towns with expected high rate of future on-lot system failure will be notified and encouraged to initiate appropriate planning to minimize the future expense of municipal collection and treatment.

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The Agency of Environmental Conservation is designated the management agency and shall implement the recommendations contained in this plan. The Agency will seek and assign funds, as they become available. The Agency will allocate staff time, when possible, to assure that the plan's objectives are accomplished. Three

years following plan certification, the plan and actions undertaken to implement its recommendations will be evaluated by a committee established by the Agency of Environmental Conservation and composed of interested and affected state agencies, environmental and public interest organizations, and representatives of the public. Following this evaluation, appropriate plan amendments may be proposed and adopted following a public review process consistent with the existing federal and state requirements.

BACKROADS EROSION CONTROL

Background

Throughout Vermont's history backroads have played an important part of the state's development. In recent years both the public and government agencies have become more aware of the economic importance of backroads as a scenic resource. In addition, as efforts to clean up the Vermont waters progress, the state has also evaluated the way in which backroads may contribute to non-point source pollution as a consequence of their construction or maintenance.

Recent studies show that the water quality impact from backroad erosion is minor when compared with erosion from agriculture. However, sediment from backroads which results from poor construction and maintenance practices can cause locally significant water quality impacts to ponds and streams. It can also lead to unnecessary repair costs to Vermont towns which may total thousands of dollars annually.

The Vermont 208 Water Quality Management Board established a study to identify ways to help reduce non-point pollution from backroads. Following completion of the study by the Ottauquechee Regional Planning and Development Commission (ORPDC), an inter-agency committee drafted a "Memorandum of Agreement" between the Agency of Environmental Conservation and the Agency of Transportation to serve as an element of the State Water Quality Management Plan. The memorandum defines a process by which the recommendations of the project consultants (ORPDC) are to be implemented.

Study Findings

Principal findings of the Ottauquechee Regional Planning and Development Commission resulted from interviews with road commissioners, district highway engineers, and state officials as well as from in-the-field observations. Principal conclusions include:

1. "Erosion and resulting sedimentation related to backroad construction and maintenance is a problem in the State of Vermont. This point of view is not shared by all practitioners and there is no quantification in the data of how serious a problem it may be."

2. "There is no uniformly applied set of standards and guidelines used in planning for and carrying out road construction and maintenance projects, including consideration of potential erosion problems."

3. "There are recognized standards and procedures that could be used to minimize erosion and sedimentation caused by road construction and maintenance activities. A workable process to assure their use needs to be developed."

4. "Current practices for controlling erosion and sedimentation are deficient as measured against both the practitioner's experience and generally accepted recommendations on the subject."

5. "There is no orientation program or on-going training program for town road commissioners."

6. "Funding limitations are perceived by practitioners as the principal restriction on the ability of town road commissioners and district engineers in doing as desired a job as possible in controlling erosion and sedimentation."

Following the completion of this study, two reports were received by the Agency of Environmental Conservation which add further perspective to the problem of backroads erosion control. The Lake Champlain Basin Level B Study prepared a report titled "Erosion and Sedimentation Non-point Pollution Sources and Controls, LaPlatte River Watershed". Average erosion rates for road bank and road surface in the study area which drains to Shelburne Bay of Lake Champlain were estimated by the Universal Soil Loss Equation at .0024 and 1.44 tons per mile respectively. When viewed in the context of the drainage basin as a whole, the average annual sediment delivered to Lake Champlain from road banks and road surfaces totaled 49.2 tons or 0.4 percent of the total sediment delivery. Much of this occurred on a few very steep road segments in the eastern hills of the basin.

Another study by the Franklin County Natural Resources Conservation District examined erosion from various land uses to St. Albans Bay. In this basin,

sediment reaching the lake from road surfaces was estimated to be 124.7 tons per year, while road banks contributed an estimated 47.1 tons per year. Road bank and road surface erosion accounted for only 3.6 percent of the sediment delivered to the lake from all land uses in the basin.

Both studies indicate that backroads on the average contribute a low level of sediment to receiving water bodies in comparison to agriculture, construction, and forest management. The topography of these basins is comparatively flat and is therefore atypical of the hilly landscape characteristic of Vermont. A substantially higher erosion rate, similar to that estimated for two steep roads in the eastern hills of the LaPlatte River watershed, probably also occurs in other areas of the state. This may result in locally excessive sedimentation and turbidity.

Management Plan for Backroads Erosion Control

Based on the study findings and recommendations of the consultants, the Vermont 208 Board approved the following plan elements.

1. Preventive maintenance is important and will be encouraged by the Agency of Transportation. District transportation administrators will be available to disseminate information to town road commissioners.

   Where water quality conditions warrant, the Agency of Environmental Conservation will be responsible for initiating and organizing other meetings on the subject of erosion control and maintenance. The Agency of Transportation will provide speakers or personnel to conduct educational field trips on such occasions. Informational meetings on erosion control will be held with such groups as town officers, planning commission members, and road commissioners.

2. The Agency of Transportation does not feel that The Vermont Backroad booklets should be formally adopted as the guidelines for construction and maintenance as comparable standards presently exist. The Agency of Transportation feels it would not be desirable to link compliance with standards to funding. The approaches to erosion control should be initiated on a voluntary basis. However, the booklets and the slide tape show prepared by the Ottauquechee Regional Planning and Development Commission would be helpful to many road commissioners. The 208 Water Quality Management Board will be approached to discuss funding for the publication of 1,000 copies of the booklet and several copies of the slide tape program. The District Highway Administrators will be available to play a principal role in the dissemination of the information.

3. Orientation programs and field seminars, though not currently conducted, will be sponsored by the Agency of Environmental Conservation with the cooperation of the Agency of Development and Community Affairs and the Cooperative Extension Service, in selected watersheds where water quality problems exist - especially in conjunction with basinwide programs to control erosion from agriculture and forestry under federal cost-sharing programs.

The approaches listed above are agreed to and endorsed by the Agency of Environmental Conservation and the Agency of Transportation. Both agencies will re-evaluate the adequacy of this approach to backroads erosion control within three years.

STATUS REPORTS ON ONGOING WORK

In addition to the 208 projects which led to the statewide water quality plan elements previously discussed, the 208 Board also funded a number of projects which, although not culminating in water quality plan elements, do nevertheless address the priorities identified by the 208 district committees and the 208 Board. These projects include

(1) A Wasteload Allocation Study for two Vermont rivers (Winooski and Otter Creek) which have nearly approached their wasteload assimilative capacity;

(2) A Municipal Sludge Nutrients and Metals Analysis Study to evaluate the potential environmental hazards associated with the land application of municipal sludge;

(3) A Regional Landfill Study which develops a process by which regional sanitary landfill facilities can be sited, designed, constructed, and maintained; and

(4) A Lay Monitoring Program for Vermont lakes and ponds which will provide both baseline water quality data on the state's surface waters and also directly involve and educate lakeshore owners in the causes and prevention of lake eutrophication.

All four of these projects are currently in progress and the discussion which follows serves to review their status as well as to present preliminary results and findings.

WASTELOAD ALLOCATION STUDY

Background

For some river segments in the state the application of secondary level effluent limitations to discharges will not result in meeting water quality standards. To protect water quality for such segments, called Water Quality Limited Segments, an allocation among the dischargers of the total maximum daily load of pollutants is necessary. Several areas of the state where wasteload allocations may be required are rivers such as the Lower Winooski River, Otter Creek, and the Stevens Branch of the Winooski.

Allocating the pollutant wasteload in a Water Quality Limited Segment is a two-step process. The first step is a technical determination of how much waste a river

(c) Parties shall be those who have received notice and such other persons as the board shall allow by rule.

(d) Appeals shall be based on the record below and findings of the Agency. The findings of the agency with respect to the questions of fact shall be conclusive if supported by substantial evidence on the record as a whole.

§1406. Coordinate Jurisdiction

If a project is subject to the granting of a permit under 10 V.S.A. Ch. 41, 43, or 151, or a certificate of public good under 30 V.S.A. §248, then the stream flow statement shall be submitted as a part of the applications under these statutes and shall not be required to be submitted to or approved by the agency under this chapter. The district commission, Water Resources Board, or Public Service Board shall thereafter consolidate the issue of adequacy of stream flow together with the other issues in the application. The minimum stream flow determination of the agency shall be conclusive as the basis for determining whether the project as proposed allows adequate stream flow.

Section 2. 10 V.S.A. Ch. 151, §6086(a) is amended as follows:

* * *

(11) Will not unduly impair minimum stream flow, as determined under 10 V.S.A. §1402.

Section 3. 10 V.S.A. Ch. 151, §6086(a) is amended as follows:

(a) The burden shall be on the applicant with respect to (1), (2), (3), (4), (9), [and] (10, and (11) of Section 6086(a) of this title.

Section 4. 30 V.S.A. §248(b) is amended as follows:

* * *

(4) Will not have an undue adverse effect on aesthetics, historic sites, air and water purity, adequate stream flow, the natural environment and the public health and safety.

§1407. Civil Fine

A person who violates a provision of this subchapter is subject to a civil fine of not more than $1,000.00. Each violation may be a separate and distinct offense and, in the case of a continuing violation, each day's continuance thereof may be deemed a separate and distinct offense.

§1408. Injunctive Relief

The agency may seek injunctive relief in the superior court to enjoin violation of this chapter.

STREAM FLOW MAINTENANCE ACT

Section 1. 10 V.S.A. Ch. 48 is added as follows:

CHAPTER 48. STREAM FLOW MAINTENANCE

§1400. Purpose

The maintenance of adequate stream flow in the waters of Vermont is recognized as a critical factor in the achievement of water quality, the support of fish and wildlife, the enjoyment of aesthetic and recreational values and fulfillment of environmental goals set under other state laws. This Chapter is intended to establish a process for identifying stream flow problems and resolving them through the cooperation and initiative of the private sector, together with existing governmental authority and expertise.

§1401. Definitions

Whenever used or referred to in this chapter, unless a different meaning clearly appears from the context:

(1) "Board" means the Vermont Water Resources Board.

(2) "Agency" means the Agency of Environmental Conservation.

(3) "Person" means an individual, partnership, public or private corporation, municipality, institution or agency of the state, and includes any officer or governing or managing body of a partnership, association, firm or corporation.

(4) "7Q10" means a statistically derived value representing the average natural low flow that occurs over a seven-day period that has the probability of occurring once every ten years.

(5) "Stream flow" as defined in this chapter is the movement of waters measured in terms of volume per unit time.

(6) "Waters" shall include all rivers, streams, creeks, brooks, reservoirs, ponds, lakes, springs, and all bodies of surface waters, artificial or natural, which are contained within, flow through or border upon the state or any portion thereof.

(7) "Project" means any dam, weir, well, canal, or water intake when such intake is for municipal, industrial or commercial purposes or when such intake serves more than three residences, or any other similar intake, impoundment or diversion facility significantly affecting the rate of flow of any waters of the state.

(8) "Stream flow determination" means the minimum stream flow appropriate for the waters affected by any project.

(9) "Stream flow statement" describes how a project conforms with a stream flow determination.

§1402. Stream Flow Determination

(a) Any person operating or intending to construct a project or intending to modify an existing project or structure on or adjacent to the waters of the state which may alter the stream flow in any way shall apply for a stream flow determination by submitting a description of the project and supply additional information required by the agency in accordance with agency rules.

(b) Within 45 days thereafter the department will advise the applicant of the stream flow determination applicable to the proposed project unless seasonal climatic conditions make such a determination impossible. In such cases the agency will advise the applicant of any delay and thereafter make such determination and advise the applicant at the first opportunity. The stream flow determination for a project will in no event be less than the 7Q10 flow at the situs of the project and may be greater than 7Q10 flow in order to maintain a viable recreational or aquatic environment where it is demonstrated that 7Q10 flow would be inadequate for this purpose.

(c) A temporary stream flow determination which may be less than the 7Q10 flow at the situs of the project may be granted by the Agency when it is found that such a flow is necessary for maintenance or repairs of a structure, required for scientific purposes, or similar activities provided no undue environmental harm results.

(d) The applicant will notify the agency within 45 days thereafter of any objection to the stream flow proposed by the agency, and within 45 days thereafter the agency will notify the applicant of its decision to affirm or modify its stream flow determination. The applicant and any person entitled to notice under §1404 may within 30 days of receipt of the agency's final determination appeal to the Water Resources Board.

§1403. Stream Flow Statement

(a) No person will commence construction of a project on or adjacent to any waters of the State which may alter the stream flow in any way prior to obtaining a stream flow determination and an approved stream flow statement, as required by this chapter.

(b) An applicant shall submit to the agency a stream flow statement describing how a project will operate after construction consistent with the agency's stream flow determination. The statement may be filed at any time after the determination is received or appeal therefrom is concluded. The stream flow statement will include an engineer's report and/or other information required by the agency in accordance with regulations prescribing its form and contents.

(c) The agency will approve or disapprove stream flow statements within 30 days of receipt. Disapprovals will be accompanied by a concise explanation of the reasons and any changes or amendments that would be required for approval.

(d) An applicant may appeal the disapproval and any party entitled to notice under §1404 may appeal the approval of any statement to the Water Resources Board by filing a notice of appeal within 15 days of receipt thereof.

§1404. Notice

(a) On or before the date of filing of an application for a stream flow determination or a stream flow statement the applicant shall send notice and a copy to a municipality, and municipal and regional planning commissions wherein the project is to be located and any adjacent municipality through which the affected stream flows. The applicant shall furnish to the agency the names of those furnished notice by affidavit, and shall post a copy of the notice in the town clerk's office of the town or towns wherein the project land lies and any adjacent municipality through which the affected stream flows.

(b) The agency shall forward notice and a copy of the application to any other state agency directly affected, and any other municipality or state agency or person upon request.

§1405. Appeals

(a) An applicant may appeal a stream flow determination or the disapproval of a stream flow statement, and anyone required to receive notice by §1404 of this title may appeal a stream flow determination or the approval of a stream flow statement by filing a notice of appeal with the Water Resources Board within 15 days of receipt of the determination or statement.

(b) The date for the appeal shall be set within 15 days of receipt of the notice of appeal and shall be held within 30 days of the notice of appeal. The parties shall not be given less than 10 days' notice.

segment can assimilate. This step includes stream monitoring surveys and the use of sophisticated computer modeling techniques. Once the assimilative capacity of a stream has been determined the second step is to allocate that capacity among the competing dischargers.

Project Status

(1) Stream Monitoring Surveys

The Water Quality Division of the Department of Water Resources has established an on-going program for assimilative capacity and wasteload allocation studies. Stream monitoring surveys for the Lower Winooski River and Otter Creek were performed during the Summers of 1977 and 1978. These studies included the collection of hydrologic and physical data as well as analysis of water quality. Data reports for these studies were published early in 1979. A similar survey was also undertaken on the Stevens Branch during the Summer of 1978 and an interim data report published, but an additional year's data will be collected before the final data report is completed.

(2) Modeling Reports

The next step is the integration of the data for each river segment into a computer model which will be used to predict changes in the dissolved oxygen levels of each stream in response to the anticipated wasteloads and different flow regimes. The modeling process is very complex and involves a number of steps including:

(1) the development of a set of technical assumptions regarding the natural processes which either contribute or remove oxygen from the river's water,

(2) the input of data resulting from the stream monitoring surveys,

(3) calibration or refinement of the model,

(4) model verification (comparing the models predictions to actual observed results under a known condition),

(5) prediction of river response to design wasteloads and critical low flows and, finally,

(6) a sensitivity analysis (determining which parts of the model when altered slightly will cause the greatest overall effect in the predictions).

A modeling report for the Otter Creek has recently been completed and verified. On the other hand, it is felt that the processes controlling dissolved oxygen levels in the Lower Winooski are still poorly understood. In addition to the two monitoring surveys completed by the Department of Water Resources (1977 and 1978) the EPA also studied the river in 1975. Although river flows, water temperatures, and wasteloads were all similar during the three studies, the measured concentrations of dissolved oxygen were markedly different. Based on this data, it is felt that algal productivity plays a dominant role in the variability of dissolved oxygen levels in the Lower Winooski and the Department of Water Resources is planning to study and evaluate this problem in more detail during the Summer of 1979. A final modeling report is anticipated during the Summer of 1980.

(3) Wasteload Allocation Process

Once the stream monitoring surveys and modeling efforts have been completed, the process of wasteload allocations will begin. A wasteload allocation task force was established in 1977 to draft a procedure for allocating wasteloads. The procedure was subsequently submitted to the Secretary of State, the Legislative Council, and the Interagency Committee on Rules and Procedures. The Legislative Council approved the process in September 1978. Public informational meetings to explain the process were held in Burlington and Rutland during October 1978 and a public hearing for adoption of the wasteload allocation process was also held in October 1978. Formal adoption of the procedures was approved, and they are presented below.

Wasteload Allocation Procedure

1. The Department of Fish and Game will make a determination as to the Water Management Type as defined in Rule 6 of the Vermont Water Quality Standards. If

anyone objects to this determination, the Water Resources Board may be petitioned to review the water quality standards in the segment and after receiving testimony make the final determination as to Water Management Type.

2. A minimum of three alternative wasteload allocations will be prepared by the Department of Water Resources.

   a. Uniform effluent limitations to all dischargers based on treatment plant design flow projections.

   b. Allocations based on wasteloads for each discharger at existing and projected populations which are planned to be served.

   c. Best practical wastewater treatment for all dischargers, then selectively increasing the required treatment level for facilities with the most impact on the river due to size or location until the assimilative capacity is satisfied.

3. Other wasteload allocations which appear to be reasonable for the situation under consideration will be prepared.

4. At a minimum, town officials, regional planning commissions, and the State Planning Office will be consulted to obtain projected populations and wastewater flows.

5. Informational materials to explain each of the alternatives will be prepared for use at public meetings and hearings and for the interested public at large. This material will also provide information on the rationale for and implications of each of the alternatives with a statement as to which one is preferred by the Department of Water Resources and why.

6. A minimum of two public meetings will be held for each wasteload allocation at a location convenient to the river basin. The first will be a public informational meeting to explain the wasteload allocation proposed by the Department of Water Resources and the other alternatives. The second will be a public hearing in accordance with 3 V.S.A. Chapter 25 (Administrative Procedures Act) to accept comments on the proposed wasteload allocation for the purpose of amending the State Water Quality Management Plan. All comments on the proposed allocation will be recorded and considered by the Department of Water Resources and their resolution presented to the

Secretary of the Agency.

7. The wasteload allocation will be adopted as a part of the State Water Quality Management Plan by signature of the Secretary and approval by the Environmental Protection Agency and will be implemented through the permit process.

8. Appeals to the wasteload allocation will be to the Water Resources Board per 10 V.S.A. 1269.

The Wasteload Allocation Process for Otter Creek was initiated in March 1979. Final adoption of the allocations is tentatively scheduled for the Fall of 1979. As stated previously, wasteloads will not be allocated to the competing dischargers on the Lower Winooski until the various technical aspects of the assimilative capacity study have been completed. In addition to the Lower Winooski, Otter Creek, and Stevens Branch studies, the Department of Water Resources has tentatively scheduled assimilative capacity and wasteload allocation procedures for sections of the LaPlatte and Connecticut River during 1980. Other possible studies include sections of the Missisquoi and Walloomsac rivers. The final wasteload allocations will subsequently be incorporated into the State Water Quality Management Plan.

MUNICIPAL SLUDGE METALS ANALYSIS STUDY

Background

Vermont's water pollution control program will result in the construction and operation of approximately 95 municipal pollution control facilities. Residual sludges must be disposed of in a manner which prevents health hazard, water pollution, and contamination of soil and groundwater. Disposal practices, to the extent practicable, should promote beneficial retrieval of nutrients and assist in agricultural production while simultaneously preventing the leaching of toxic constituents to the groundwater regime below.

There is a need for land sludge disposal standards addressing the toxic constituents of Vermont municipal sludges, in the concentrations typically encountered and promoting beneficial disposal practices within confines of assured public health and the prevention of groundwater pollution. The standards adopted will guide issuance of NPDES permits under Section 402 of PL 92-500 and the related control of sludge disposal under Section 405 of that act.

The objective of this study is to determine the suitability of Burlington's sludge for land application. Through a literature review of current research and lab analysis, a comparison will be made of the metal concentrations of Burlington's sludges and recommended application limits. This study will provide data on the metal and nutrient content of selected Vermont municipal sludges so that municipal and state regulatory officials can best determine the suitability of Vermont sludge for land application.

Preliminary Results

- Metals Analysis of Burlington Municipal Sludge

1. Results of Data

- Mercury levels in sludges from the Burlington East Plant were higher than the recommended state concentration (10 ppm)
- Copper concentrations exceeded the state concentration recommended of 1000 ppm in all but two samples from the three Burlington treatment facilities

- Nickel concentrations exceeded the recommended limit of 200 ppm in all sludges from the Burlington main plant
- Though cadmium (usually the metal of most concern) was below the state limit (15 ppm), it was always greater than 1% of the zinc concentration

2. Analytical Methods

The metals testing method (perchloric-nitric acid digestion) is both inconvenient and dangerous. The precision of various methods is being determined by analysis of replicate samples by four labs on two different sludge samples and an EPA spike sample. This will also indicate whether another digestion method is feasible since at least one of the labs is using a method other than perchloric-nitric acid.

3. Calculated Metal Loadings on Land

Even though the above four metals exceeded certain recommended limits, the general feeling gained from the literature search and communications is that total metal accumulation on land is more important. Based on using 300 lbs. TKN (Total Keldjahl Nitrogen)/ acre as a limiting factor for corn production, the total metal loadings were calculated for sludges from the three treatment plants. When these loadings are compared to the current EPA standards /EPA MCD-28 (430/9-77-004) Oct, 1977/ only copper seems to present a problem. These calculated loadings though do not account for the possibility of mixing or blending different sludges on the same land parcel. The copper loading value may be brought within EPA limits by blending sludges with a high and low copper concentration.

- Literature Study

A preliminary literature review has been completed but at this time there has been no comparison between metal values at the Burlington facilities and those from studies performed elsewhere.

* * * * *

The metals and nitrogen testing procedures are currently being reviewed and revised, based on experience gained in this study and from communication with other researchers across the country. Changes to procedures, as defined in the contract scope of services and in this interim report, will be presented in the final report. The goal is to develop an accurate but inexpensive, easy and safe testing method which can be used by the state lab and all Vermont municipalities, or their contracted labs.

The final report will summarize the sludge disposal problem in Vermont. It will discuss sludge characteristics and typical metal concentrations, sludge quantities and treatment and disposal methods in Vermont. It will also discuss regulatory constraints, including the status of EPA Section 405 regulations and guidelines. It will present collected data and summary, bibliography and selected abstracts of important articles and communications.

The final report will define options for solving Burlington's and other Vermont municipalities' sludge disposal problems, with pros and cons. It will present conclusions and recommendations regarding land use of sludge in the context of its metal and nutrient content. The report will be completed by September of 1979.

REGIONAL LANDFILL STUDY

In August of 1978 the Agency of Environmental Conservation developed a contract with the Rutland Regional Planning Commission to locate a site for a regional sanitary landfill so as to provide an alternative to the numerous polluting municipal dumps in Rutland County. Several sites have been evaluated and a parcel has been selected for purchase. Preliminary engineering tests by consulting engineers indicate that the site is ideal for the proposed use from the standpoint of groundwater, soils, and access. An attorney has been retained to handle land acquisition.

Concurrently a Joint Municipal Survey Committee has been formed in accordance with procedures outlined in 24 VSA 121. This committee is charged with developing background information and with deciding on an appropriate structure for a regional union municipal district. This district will have the power to raise money to develop and operate the landfill. Representatives from 16 towns attended the first meeting held in May 1979. It is expected that a larger body will ultimately form the union municipal district. The next phase of the project will be to acquire the parcel and to prepare a contract for detailed site engineering. This project is intended to serve as a model to guide similar efforts in other parts of the state. During the course of the contract it has been learned that the Rutland region will probably obtain funds to develop a regional solid waste resource recovery facility. The landfill developed as part of the 208 project will be the primary waste disposal site while this facility is in planning and construction. Once completed, the landfill will serve as a disposal site for residues from the resource recovery facility.

Although this project is scheduled for completion in 1979, the date on which the final report will be submitted will depend on the date of land acquisition.

VERMONT LAY MONITORING PROGRAM

Background

It is well recognized that Vermont's 527 lakes and ponds provide a major source of recreation to Vermont residents and non-residents alike. Aside from the aesthetic values associated with such natural resources, the economic impact of aquatic related recreation is significant on the local level. Assuming that the demands on the recreational potential of Vermont's lakes and ponds will increase in the future, there exists a definite need for a mechanism by which the quality of the state's waters can be determined and long-term trends can be established. Such a program is valuable in order to evaluate the effects of increased cultural usage of Vermont's drainage basins on the quality of the aquatic resources. Personnel limitations within the Department of Water Resources limit the extent to which wide-ranging, long-term monitoring can be accomplished by the department. It was therefore advisable to establish a program which would aid the department in collecting data relevant to the determination of existing water quality and subsequent trends.

In light of the fact that many local interest groups and municipal organizations directly involved with specific aquatic resources have expressed an interest in and a desire to participate in a program of water quality evaluation, it was proposed that the Department of Water Resources take advantage of this interest by developing and initiating a program of citizen (lay) water quality monitoring. The objectives of this program are as follows:

1. To establish a data base adequate to determine the existing water quality primarily in terms of Trophic State Index (TSI) and assist in determining lake trophic levels.

2. To monitor long-term trends in water quality primarily in relation to the TSI.

3. To provide a data base adequate enough to utilize various mathematical modeling tools for the purpose of lake management.

4. To provide a mechanism by which the Department of Water Resources can directly educate local citizens in, and stimulate their awareness of, the causes and consequences of eutrophication.

Project Status Report

- Activities of Summer 1978

During the summer of 1978, a student intern working for the Department of Water Resources made 29 presentations (including 852 persons) to a variety of citizen groups throughout the state, including lake associations, YCC camps, rotary clubs, and other interested groups. The presentation included a showing of the lake eutrophication film (produced by the 208 program) followed by a discussion of the water quality problems of Vermont's lakes and ponds and the lay monitoring program which was being planned to address those problems. In addition to the presentations, all lake associations were notified of Vermont's planned lay monitoring program and given the opportunity to participate in its first year of operation. As of the spring of 1979, 32 lake associations expressed a willingness to cooperate in the program and an additional 17 sites on Lake Champlain were established by cooperation with the Lake Champlain Committee.

- Development of Sampling Program

All lay monitors were assigned to an "advanced" sampling program including weekly measurements of Secchi disk transparency and collection of Chlorophyll-a samples (to be analyzed by the Department of Water Resources). During the spring, 1979, the lay monitoring coordinator purchased and prepared the equipment necessary to assemble lay monitoring sampling kits, and coordinated the sampling activities to facilitate scheduling of sample collections statewide.

- Instruction and Education of Lay Monitors

During May 1979 four in-door training sessions were held by the project coordinator in Burlington, Montpelier, Newport, and Rutland. An information booklet "Vermont Lay Monitoring Manual" (including goals, program objectives,

description of sampling methods, step-by-step sampling instructions, presentation of data, and data interpretation) was distributed and discussed at these sessions. The booklet was prepared as part of the project. During the sessions the sampling procedures were demonstrated and the relationship between sampling parameters and the lakes trophic status was discussed. The project coordinator is currently making on-site visits to each lay monitor to ensure that the sampling procedures are well understood and to assist monitors on their first sampling run.

- Evaluation and Distribution of Sampling Data

Following the summer sampling period, the project coordinator will evaluate and interpret all data in terms of the lakes trophic status. The report will be distributed to all lay monitors and a system will be developed for displaying the data locally for accessibility to all lake residents. Lay monitors will also be encouraged to present results to their respective lake associations as well as to other interested local groups.

- Program Evaluation

The effectiveness of the lay monitoring program will be evaluated both by the lay monitors and by the project coordinator. An evaluation form for lay monitors will be developed and a final report prepared for the state.

- Related 208 Projects

The Vermont 208 Program has also been involved in a number of projects which are indirectly related to the Lay Monitoring Program. These projects focus on the problems of lake eutrophication and lakeshore development and include the following.

(1) Water Quality Reports for Woodbury Lake, Lake Elmore, and Joe's Pond

These reports describe the physical, chemical, and biological characteristics of the water bodies and attempt to evaluate the impact of land use practices in the adjacent watershed (i.e., phosphorus loadings). In each report a series

of recommendations are made to ensure the preservation of the lakes water quality.

(2) Model Regulations for Vermont Municipalities for Controlling the Conversion of Seasonal Dwellings to Permanent Use in Shoreland Areas

This model ordinance is designed to protect surface waters from increased nutrient loading resulting from on-site wastewater disposal systems that are inadequate to handle the increased volume of wastewater from seasonal homes which have been converted to permanent residences.

(3) Model Enabling Legislation for Lake Protection Districts

The major purpose of this enabling legislation is to establish a district concerned with lake water quality which can encompass the entire lake drainage basin, rather than just the lake shore.

(4) Lake Shore Conservation Manual

The Department of Water Resources is in the process of developing a booklet containing guidelines for protection of lake shore and stream shore property. The booklet, which will be directed toward landowners, will deal with methods of land use and the management of shore vegetation which protects the state's waters from impacts such as excessive clearing, nutrient and sediment pollution; and the construction of in-water structures which alter aquatic shoreline habitats.

WATER QUALITY STANDARDS REVIEW AND REVISION

The Water Quality Standards were revised and adopted by the Water Resources Board on March 1, 1978. Basically, the format and organization of the standards was changed in an attempt to make them more understandable. In several specific instances, wording of rules was clarified, but no weakening of the standards occurred.

A current copy of the Water Quality Standards is included in Appendix B.

STREAM FLOW MAINTENANCE LEGISLATION

Background

The maintenance of adequate streamflow in the waters of Vermont was recognized in the 303(e) River Basin Plans as a critical factor in the achievement of established water quality standards, the support of fish and wildlife, the enjoyment of aesthetic and recreational values and the attainment of environmental goals set under various state and federal laws. For example, hydroelectric facilities often impound water for long periods for utilization at peak power demand times. This results in almost no flow in the affected river during certain critical periods of the year, resulting in violation of water quality standards (primarily very low dissolved oxygen levels), stress or death of aquatic organisms, and reduced recreation opportunities such as fishing and swimming. Water quality is directly linked to water quantity by virtue of the fact that a minimum river flow is necessary to maintain an adequate habitat for aquatic life. The existing regulatory framework is not adequate to meet environmental goals while at the same time meeting the objectives of environmentally conscious developers of hydroelectric power sources widely acclaimed as one of the cleanest energy sources. Enabling legislation is required to effectively link the water quality and water quantity problems within the same program.

Existing regulatory authority related to the question of streamflow maintenance includes:

1. State environmental statutes, including the process for developing permanent wasteload allocations and the requirement of a National Pollution Discharge Elimination System discharge permit.

State environmental statutes and regulations require that wasteload allocations (a maximum wasteload assigned to a community) be developed and implemented and that waste treatment facilities be constructed that will result in water quality standards being met at a minimum river design

flow has been defined in the water quality standards and is the streamflow deemed necessary to protect aquatic life in the river. State law does not provide a clear process to assure that the necessary minimum streamflow will be provided by any new or existing private or public hydroelectric facility or other project affecting streamflow. The Agency of Environmental Conservation is required by 10 V.S.A. Section 1084 to investigate the potential effects on fish and wildlife habitats of any dam impounding more than 500,000 cubic feet of water and shall certify the results to the state agency having jurisdiction prior to any hearing relating to the determination of public good. In those cases where the dam is a hydroelectric facility, the agency has no clear authority to require minimum downstream flow rates. Thus, there is no assurance that expensive waste treatment facilities constructed below hydroelectric facilities will result in maintenance of established water quality standards necessary to support aquatic life.

2. The state utility regulatory process

The second area of potential state authority to deal with the water quality/quantity issue in Vermont is the area of utilities regulation. There appears to be little question in 30 V.S.A., Section 248, that the maintenance of minimum in-stream flows would be a valid subject for consideration at a Section 248 hearing, which concerns the determination of public good. This authority, however, is generally confined to public electric generation facilities and even then may be preempted by the federal regulatory process. It is clear that the Public Service Board operates with the same institutional deficiency as the Agency of Environmental Conservation; i.e., lack of specific authority to deal with the water quality/quantity problem.

3. The federal utility regulatory process

The Federal Energy Regulatory Commission (FERC) has the primary authority to license hydroelectric facilities. Through its regulatory process FERC can

be effective in maintaining streamflow below public hydroelectric facilities. It should be stressed that the decision-making role in the federal license proceeding is solely federal and states may only make recommendations. In cases where violations of the Federal Water Pollution Control Act are the basis for state recommendations, the basis for FERC preemption may be severly reduced.

In conclusion, there is no clear authority to require maintenance of the necessary streamflow below private and public hydroelectric facilities or other projects which may affect the rate of flow of any waters of the state. This is critically important because streamflow is a primary determinate of water quality, aquatic life, recreation, and aesthetics.

The following Streamflow Maintenance Act is an attempt to combine and simplify the resolution of the water quality/quantity conflict and its enactment is necessary to assure adequate streamflows to achieve the environmental goals as set under other state laws as well as to promote the development of clean electric power sources in an environmentally sound way.

The proposed legislation was introduced in the 1979 legislative session and never left committee. As can be expected with proposed legislation of this type, considerable concern has been shown by the hydroelectric interests with regard to the loss of generating capacity should minimum stream flows be required. The bill, however, is receiving the full support of the Agency of Environmental Conservation and action on it is hoped for during the 1980 session.

A more complete discussion of the problems and issues described above is presented in a report prepared by the Vermont Attorney General's office with the assistance of the Agency of Environmental Conservation. (Appendix C).

WATER CLASSIFICATION SUMMARY FOR VERMONT

Background

At present, there is no comprehensive source of information pertaining to Vermont river and stream classifications available to the general public. In the past, classification maps were prepared on a basin-by-basin basis and distributed to interested persons. In 1976 a fire destroyed many base maps and classification maps which have not yet been redrawn. In an attempt to bring together the most recent classification information and provide the public with water classification information in an easily-understood format, a statewide classification map was proposed showing Class A, B, and C waters as recognized by the Water Resources Board and watersheds recognized by the Department of Health as being utilized as municipal drinking water sources.

Progress to Date

All classification orders and appeals have been reviewed and incorporated on a base map. The Department of Health files have been reviewed and their information has also been incorporated on the map. A close review and checking of the map is needed before submission to the cartographers for the preparation of a master copy. Color printing is anticipated and a finished water classification map of Vermont should be available for distribution by early 1980.

AGRICULTURAL RUNOFF PLAN

Governor Snelling certified the Vermont Water Quality Plan for Controlling Non-Point Source Pollution from Agriculture on October 25, 1978. Several state and federal agencies have since taken actions which implement the plan's recommendations. The 208 Board has also initiated projects which implement the plan as part of its Phase II FY 1978 Work Program.

The plan designates the Vermont Natural Resources Conservation Council as the state management agency responsible for the Rural Clean Water Program. In this capacity, the Council has begun to adjust its mode of operation to enable it to perform duties required of the management agency by federal regulation. The Council has submitted a detailed program of duties to the U. S. Environmental Protection Agency. This document clarifies the Council's role in the management of the Rural Clean Water Program and identifies the sources of funds which are necessary to perform these duties. Concurrently, the State Conservationist has prepared two applications for funding non-point source control cost sharing on behalf of the State Rural Clean Water Coordinating Committee. These applications call for the cost sharing of farm practices in the Black River Basin and in the watershed which drains into St. Albans Bay. Local public meetings on the applications were recently held in both project areas. At the present time the applications are undergoing an A-95 review. The documents will be submitted for funding by August 1, 1979.

The Soil Conservation Service is further implementing the Vermont 208 Agricultural Plan by seeking federal farm conservation practice cost sharing under PL 83-566. The Soil Conservation Service expects to begin a ten-year cost-sharing program during the summer of 1979. This program will abate non-point run off in the LaPlatte River Drainage Basin (Priority III). The Soil Conservation Service is also completing a second application for cost sharing under PL 83-566 to obtain funds for a Lower Otter Creek watershed project (Priority V).

The Vermont office of the U. S. Department of Agriculture, Agricultural Stabilization and Conservation Service, also has sought funds for non-point source control cost sharing. In early 1979 this office prepared an application for the Winooski River Drainage Basin (Priority VI). Unfortunately, the U. S. Department of Agriculture was unable to fund this proposal due to limited funds for this purpose.

State and federal agencies have also implemented recommendations in the 208 Agricultural Plan by modifying the emphasis of ongoing farm assistance programs. The Soil Conservation Service, for example, has assigned greater importance to management practices which protect water quality. Such practices are appearing more frequently in farm conservation plans. Some farmers have already responded by installing such practices as manure storage facilities and stripcropping. The Soil Conservation Service is upgrading its capacity to deliver technical advice in the areas of animal waste management and erosion control methods. This year it is estimated that the Soil Conservation Service will assist in installing over one hundred new animal waste management systems. Although the ASCS cost sharing program will, in some cases, provide a minor financial supplement of up to $2,500, farmers themselves will provide most of the funds for these facilities. The Soil Conservation Service projects a dramatic increase in the number of animal waste structures constructed annually as RCWP funds become available.

Although funds provided through the Agricultural Stabilization and Conservation Service for animal waste structures have increased over the funding level of previous years, payments for this purpose represent only a small fraction (about four percent of the annual ASCS budget). These payments in part come from funds released by the discontinuance of certain ASCS practices, such as subsurface tile drainage which were found to contribute to water pollution. Although ASCS has made minor program changes to fund water pollution abating practices, its commitment in this area is still limited.

ASCS has discouraged cost sharing for manure storage structures in watersheds where RCWP cost-sharing funds may become available in the future for this purpose.

The proportion of funds in the annual ASCS budget which are allocated for lime and for fertilizer has remained essentially unchanged in 1978 when compared with the previous year.

Several additional noteworthy actions to implement the 208 Agricultural Plan in Vermont can be attributed primarily to the Soil Conservation Service and the Agency of Environmental Conservation. The Soil Conservation Service had adopted a "worst first" policy whereby it assigns the highest priority for technical assistance to farmers which have serious erosion problems. The Soil Conservation Service is now also actively encouraging stripcropping and terracing in Vermont.

To further promote the use of best management practices on farms throughout the state, the Vermont 208 Board, in cooperation with the Soil Conservation Service, is preparing instructive materials which describe minimum agricultural best management practices recommended to control soil erosion in manure runoff. This project of the Phase II 208 Program will promote these guidelines and encourage farmers to apply their knowledges of practices which protect water courses and water bodies from polluting non-point source runoff.

Finally, the Soil Conservation Service is attempting to identify other drainage basins where special efforts are necessary to protect water quality. The Soil Conservation Service has initiated a four-year study in cooperation with the Agency of Environmental Conservation, which will inventory and evaluate selected watersheds throughout the state. The findings will guide future cost sharing and non-point source control educational efforts in Vermont. The program has been funded at $45,000 in 1979 and it is scheduled to be completed by 1982.

FORESTRY PLAN

The 208 Forestry Plan is currently before the governor for final certification. The plan has received approval by the 208 Board, the Agency of Environmental Conservation, and by the public. On the basis of this preliminary approval, several actions have been initiated to implement the plan's recommendations.

The plan gives principal emphasis to education. The Vermont Timber Truckers and Producers Association (VTTPA) has volunteered to assist the state in reducing non-point source pollution resulting from logging jobs. This statewide organization with a membership of nearly one half of the state's loggers will promote better practices by a self-education, self-policing procedure.

The VTTPA has subdivided the state into three regions and elected three-man committees in each region. Committee members represent all sectors of the forestry industry and serve on a voluntary basis. As complaints arise involving logging jobs, they are forwarded to water resource investigators who in turn contact the appropriate VTTPA committee. In several instances these committees have already met with loggers and satisfactorily resolved water quality problems by encouraging the use of best management practices. Although the program has not been in effect long enough to judge its overall effectiveness, water resource investigators have reported a new attitude and higher level of responsibility on the part of loggers who have been contacted. Since the system went into effect problems encountered have been resolved quickly and effectively.

A second aspect of the plan calls for the use of erosion control workshops. One workshop was held in 1978 at Stratton Mountain as a means of providing technical information, demonstrations, a review of legislation, and assistance regarding the control of non-point source runoff from logging activities in the state. Three additional workshops are planned for this summer. The Agency of Environmental Conservation hopes to reach one half of the loggers in Vermont in

1979. It also intends to deliver the best management practices manual to all loggers in the state by the end of 1979. Other recipients of the best management practices guidebook will include the following agencies and personnel.

Agency of Environmental Conservation District Offices (5)
County Foresters (12)
UVM Extension Service, Forestry and Water Resource Specialists
Extension Service County Offices (14)
Water Resource Investigators (7)
Regional Planning and Development Commissions (13)
Vermont Timber Truckers and Producers Association
Consulting and Industrial Foresters
Vermont Natural Resources Council
Soil Conservation Service County Offices (14)
Vermont loggers (800)

The Agency of Environmental Conservation has also developed a slide-tape program which describes the history of the state's 208 non-point source program, the effects of timber-harvesting practices on water quality, "Best Management Practices" in the form of erosion control guidelines, and the current plans the state has initiated to deal with these problems. The slide-tape program will be made available to both interested groups and the general public.

Logging-related erosion problems will be minimized through the continuing implementation of the plan's educational program over a period of several years. Reducing soil erosion from logging is a long-term process which will require a persistent effort on the part of the State of Vermont. An evaluation of both the state's actions as well as an overview of the effectiveness to these actions will be necessary in the future. Once the plan has been in effect for two years the next step will be to decide whether any added steps will be necessary in this portion of Vermont's water pollution program.

BACKROADS PLAN

The backroads management plan emphasizes an educational approach to controlling non-point pollution from road surfaces and road banks. The plan describes a management strategy by which the state will prepare and deliver educational materials and programs to rural road commissioners, selectmen, and highway engineers. The plan also calls for the coordination of intensive training efforts with other activities to control erosion from silviculture and agriculture non-point pollution in basins with serious water quality problems. At this time the plan has been reviewed and endorsed by the Agency of Transportation, the Agency of Environmental Conservation, and by the public at four statewide public meetings. It is anticipated that the governor will shortly certify the plan.

Activities to implement the plan are already in progress. Two comprehensive manuals have been written and illustrated to describe proper methods for maintaining and controlling erosion from rural roads. These instructional manuals will be delivered to all of the state's road commissioners and town officials by August 1, 1979.

In addition, a slide tape program to orient rural road commissioners has been developed and will be reproduced and distributed to all district highway administrators during the summer of 1979. Workshops with road commissioners will be arranged for the fall of 1979 and the spring of 1980.

SEPTAGE PLAN

Since the governor certified the State Water Quality Plan for Septage Management in 1978, the Agency of Environmental Conservation has begun to implement several of the plan's recommendations. An engineering geologist has been hired to oversee the septage management program. Using information contained in the 208 technical reports on septage, the geologist drafted septage management guidelines which the Agency will adopt as a state standard. The Agency is conducting a careful evaluation of the proposed document. During the summer of 1979 the Agency will monitor the ground and surface water near several existing septage disposal sites. From this study it will attempt to evaluate the appropriateness of proposed standards to Vermont conditions. The guidelines will be released for public review late in 1979. Public comments will be resolved as appropriate. The Agency plans to release the final guidelines early in 1980. The Agency will implement other aspects of the Septage Plan on a continuing basis. An evaluation of individual disposal sites, assistance to town governments, and an instructional program for municipal officers and haulers will all be given special attention.

ON-SITE WASTEWATER DISPOSAL PLAN

Phase I of the Vermont 208 Program included several projects which examined the on-site wastewater disposal situation in Vermont. The projects revealed a high failure rate and a generally high hazard to health through surface and possibly groundwater contamination. In addition, the studies indicated that the state's existing institutional structure is inadequate at this time to properly control these problems. As a result of this work, the Agency of Environmental Conservation and the 208 Board have cooperated in the development of a draft 208 plan for on-site wastewater disposal in Vermont which, if approved by the governor, should lead to a major revision of Vermont's off-stream wastewater disposal program. At this time the state plan on the subject is being refined. The draft will be available to the public shortly. Certification is anticipated during the summer of 1979.

During the course of Phase I planning the public was informed on the technical and administrative issues which pertain to on-site wastewater treatment. It is hoped these efforts would promote a better understanding of the rationale for the recommendations which would be developed in the 208 On-Site Wastewater Disposal Plan. Phase I of the 208 program which describes procedures that town officials can utilize to better plan, manage, and regulate on-lot wastewater disposal. Related materials which were developed during Phase 1 include the following.

1. 25,000 copies of a septic system maintenance manual were printed and distributed throughout the state
2. A two-volume manual and workbook on rural wastewater treatment alternatives and planning strategies was prepared for use by municipal officials
3. A two-day conference on alternatives to sewers was held in 1977. This was attended by over 300 town officials, engineers, and citizens
4. On a pilot basis, rural communities in southeastern Vermont were evaluated for potential on-site wastewater problems and selected towns were assisted in developing preventive or remedial actions
5. The failure rate of septic systems was studied in five towns in western Vermont with slowly permeable soils.
6. A review of less expensive wastewater treatment alternatives were studied for a small village - Arlington

The recommendations of project consultants have now been evaluated and, where appropriate, incorporated into the State 208 Water Quality Management Plan for On-Site Wastewater Disposal. Through the Phase II 208 Program, the Agency of Environmental Conservation will cooperate with the 208 Board in implementing a new program which resolves identified problems and carries out recommendations described in the 208 On-Site Wastewater Disposal Plan.

PUBLIC PARTICIPATION

The State of Vermont chose an approach to water quality management planning that brought together representatives of regional, local, and state agencies. These parties were included since they would ultimately be called upon to implement the recommendations of the State Water Quality Management Plan. (Figure 1)

Vermont 208 Board

A 22-member Water Quality Management Planning Board was carefully selected and then appointed by the governor to represent all levels of government. During Phase I the State 208 Board, consisting of representatives of key state agencies, yet with a majority of representatives from local government, has set planning policies, priorities, and responsibilities and allocated financial resources in the development of the outputs as specified in the 208 Program Work Control Plan.

District Committees

In his Executive Order of April 15, 1976, Governor Salmon charged the State 208 Board with creating eight district committees; (one for each administrative district) for the purpose of examining the water quality problems in their districts and of making recommendations for their solutions to the State 208 Board.

Prior to asking the district committees to identify water quality problems, the staff of the Department of Water Resources and members of the 208 Executive Committee attended district meetings in order to outline the purposes of 208 planning, the functions of the district committees, and water quality problems identified in the districts during 303(e) Phase I River Basin Planning.

At a series of meetings, district committees were asked to identify the water quality problems within their districts.

After reviewing a 208 staff's position paper at the November 16, 1977 Board meeting, the State 208 Board voted that elements for 208 funding be considered in the following order:

1. Sedimentation and erosion
2. Alternatives to sewers
3. Sludge and septage disposal
4. Lake eutrophication
5. Assimilative capacity
6. Combined sewers
7. Groundwater contamination

The State 208 Board then asked the 208 staff to develop projects under each of the major headings for review by the Board.

The Board recognized that, for the program to involve the public, 208 related work should (whenever possible) take place within each district. The results of the work must be transferable statewide. The 208 staff again met with each committee in order to identify a specific water quality problem which the committee would like to have solved within their district.

It was not possible to identify projects which could be performed in all districts. Because of this, the roles of each District Committee during Phase I varied. Some met and regularly reviewed the progress of projects while other committees gradually became inactive. The original lists of priority concerns identified by the District Committees have been retained and unresolved problems have now been listed on the Department of Water Resources Planning and Management Chart. These problems will receive attention as funds become available.

Agricultural Committee

The 208 Board realized that implementable methods to control erosion from agricultural practices require the endorsement of the Vermont agricultural community. Therefore, the State 208 Board appointed an Agricultural Runoff Committee. The Committee included practicing farmers and representatives of those agencies or organizations which provide assistance to the farmer: Soil Conservation Service, Agricultural Stabilization and Conservation Service, and the University of Vermont Extension Service. The Committee's responsibilities included:

1. Determining farming practices which impact water quality.

2. Evaluating existing conservation programs and/or regulations and their capacity to reduce impacts on water quality.

3. Assessing the need to extend present conservation programs and/or to adopt further regulations.

4. Evaluate the impact of recommended solutions upon the farming community.

The committee supervised 208 planning to accomplish these objectives. The outputs of the committee are included in the bibliography of this report.

Forestry Committee

A special task force* was also established to assess the impact of forestry operations on water quality and to explore alternative solutions to the problems where they are found to exist. The Committee met during 1978 and 1979 to review the findings of a committee-sponsored study of logging practices in Windham County. The Committee also examined the findings of other related studies underway in Vermont which pertained to the impact of man-induced forest runoff. The 208 staff cooperated closely with the Committee in the developing of the final 208 plan for silviculture and in writing a state forestry erosion control manual.

Newsletters and Fact Sheets

A newsletter was published periodically to inform Vermont's residents of water quality issues and to generate interest in water pollution control and prevention. Numerous issues were reported on, including the activities of the State 208 Board and the District Committees, and on technical aspects of the program. Fact sheets have been widely circulated to inform the public on the content of plan elements prior to public meetings.

News Columns

News columns were also periodically published during the program in weekly newspapers throughout the state. Through these columns the staff sought to

*see page ii

broaden citizen understanding of and citizen participation in the 208 effort.

Special Reports

Special reports of 208 water quality issues provided non-technical discussions of technical issues. Two bulletins were directed toward educating the public, district committees, local officials, and the State 208 Board. One document described the State Water Quality Standards which were revised by the 208 staff in conjunction with the Water Resources Board. Twenty-five thousand copies of a second booklet on septic system maintenance were printed and many of these have been distributed throughout the state in response to requests for them.

Radio and Television

In 1978 radio spots were produced and aired regularly on Vermont radio stations. On several occasions television stations carried discussions on issues under consideration in the 208 planning process. News releases were issued frequently to announce public meetings, planning studies, and the content of plan elements.

Conferences and Workshops

Conferences were held at several points as an educational tool and as a way to share ideas with the public on specific issues central to 208 planning. Conferences on "Alternatives to Sewers" and "Non-Point Source Pollution" were held in 1977 and 1978 respectively. The Proceedings from the first conference have been widely circulated in Vermont. Workshops were used as an in-the-field mechanism to demonstrate proper erosion control methods at logging jobs. This technique of educating loggers has proved to be effective and will be continued at two or three locations in 1979.

Slide Shows and Films

Slide shows, brochures, and exhibits have been created and made available to the public at appropriate points during the program. These materials provided short, descriptive, and understandable visual presentations of the program at its various stages. Two film makers produced a 30-minute film "Eutrophication - An Abundance of Life". This described biological and physical processes which occur in a lake during the ageing process. In the summer of 1978, an intern circulated the film among lake associations and assessed public interest in participating in a long-term lake lay monitoring program. The Board subsequently authorized the printing of two additional copies. Each has been in nearly-continuous use through the Department of Water Resources and the State Library. The 208 program has also produced slide-tape programs on the relationship between agricultural land use and water quality, on forestry erosion control, and to introduce manuals which describe backroad maintenance on erosion control. Both a video tape and slide-tape program were prepared to complement a curriculum guide on the control of erosion and the affects of sediment on the aquatic biota.

Public Meetings

A variety of public meetings were held. Initially such meetings afforded the public an opportunity to comment on State 208 Board priorities (see District Committees). A number of public meetings subsequently held were to obtain public comment on each of the Agricultural, Septage, Forestry, and Backroads Plan Elements. A series of meetings, funded by a special EPA grant, was conducted by the League of Women Voters to obtain comment on proposed plan elements.

Technical Advisory Committee

Technical advisory committees were formed to monitor most of the individual 208 planning projects. Laymen, members of local or state organizations,

technicians, and governmental representatives participated in these meetings to regularly provide contractors with advice. The committees' responsibilities were established in the projects' Scopes of Services. In some cases the committees were purely advisory while in other instances the committees were assigned decision-making roles.

Water Resources Planning and Management Chart

In order to present a comprehensive picture of both statewide and local planning priorities, the Agency of Environmental Conservation, Department of Water Resources, developed a comprehensive list of water quality problems and actions necessary for their resolution. This chart was reviewed by the 208 Board in making project-funding decisions. The purpose and use of the chart is described in the attached sheet.

WATER RESOURCES PLANNING AND MANAGEMENT CHART

This chart is designed to enhance the effectiveness of planning and management of the state's water resources. It does this in several ways.

1. It identifies and describes existing and potential water resources problems, both local and statewide.
2. It identifies the planning and management needed to resolve each problem.
3. It identifies existing and potential funding sources to aid in the planning and management efforts.
4. It indicates opportunities for the development of facilities for recreation where water pollution control plants are constructed.
5. It identifies a contact person who is the individual having day to day responsibility for problem resolution.
6. It assigns priorities to the problem so limited funds can be applied in the most effective and timely manner.
7. It permits more informed agency, public and 208 Board comments in assigning project priorities by showing individual problems in the framework of others.
8. It provides an overview of state water resources problems and the status of their resolution as a basis for the annual agreement with EPA on work items to be accomplished during the fiscal year.

Priorities for the resolution of problems will be set by the Agency of Environmental Conservation after consideration of public and 208 Board comments and after considering the following criteria.

a. Can work restore impaired water uses?
b. Can work result in major savings in the state and local municipalities?
c. Can the work avoid deterioration of water quality?
d. Is the work <u>required</u> or <u>suggested</u> by EPA?
e. Will problems become worse if unattended?
f. Will a large number of people be affected?
g. Should the problem be solved by the state or by local government?
h. Does the work evaluate and develop plans to avoid <u>serious potential</u> water resources problems?
i. Is the work needed to support imminent decisions (management and construction)?
j. Cost of project?

This chart will be continuously revised and updated to reflect the identification of new problems and resolution of old problems as well as any changes in priorities. Comment forms are provided to those interested in aiding in this important process.

BIBLIOGRAPHY OF VERMONT 208 PROJECT REPORTS

On-Site Wastewater Disposal

Are There Alternatives to Sewers for Vermont Towns?, 1977

Proceedings of a conference examining a wide range of alternatives to sewer systems. Topics include septic tanks; health and management concerns; septage disposal; alternative systems for single family homes, subdivisions, and clusters; environmental and economic impacts; institutional arrangements; case studies; and a panel discussion. 148 p.

On-Site Sewage Disposal Systems for Slowly Permeable Soils, 1979

Evaluation of the effectiveness of on-site wastewater disposal systems serving single family residences on slowly permeable soils. A questionnaire followed by a site and soil evaluation of 340 residences was performed in order to determine factors contributing to the proper functioning and malfunctioning of soil absorption systems. In addition 40 of the surveyed systems were monitored (i.e., percolation tests, excavation, effluent sampling, and periodic inspections). General and specific information regarding septic system function relative to size of system components, age, history of operation, water consumption, site and soil conditions are discussed. 66 p.

Selecting Communities for Wastewater Planning, 1978

Development of methodology whereby unsewered communities within a region may be surveyed to select villages where new discharges to surface water bodies may be prevented by careful planning for wastewater disposal in new development. Criteria include soils information, data on past septic system failures, and population growth rates. Three communities were subsequently selected for pilot wastewater management planning. 31 p.

- Whitingham Sewage Management Investigation, 53 p.
- Felchville Sewage Management Investigation, 32 p.
- Bondville Sewage Management Investigation, 18 p.

Alternative Wastewater Systems for a Small Community, Arlington, Vermont - A Case Study, 1978

Includes analysis of growth and development alternatives, assessment of alternatives, defining the pollution problem, characteristics of the project area, and system design recommendations. 118 p.

Rural Sewage Treatment in Vermont, 1978

A two-book series:

Book I, A Guide to the Alternatives, explains basics of sewage treatment, Vermont sewage treatment laws, and available treatment methods. 116 p.

Book II, A Planning Manual, is a guide to the study of community sewage problems and preventive methods. 89 p.

Septic Systems - How They Work and How to Keep Them Working in Vermont, 1978

A public information booklet describing and illustrating basic principles of septic system operation and maintenance. Covers household sewage, the septic system, the septic tank, the leaching system, locating septic systems, identifying septic system failure, predicting and preventing system failure, septic tank pumping, repairs, and assistance. 17 p.

Model Sewage Disposal Ordinance for Vermont, 1979

Model regulations aimed at preventing health and environmental hazards from improper wastewater treatment and disposal. Covers administration, permit procedures and applications, soil and site evaluation, system design, leach field installation, maintenance and site modifications. 38 p.

Model Regulations for Vermont Municipalities for the Control of Conversion of Seasonal Dwellings to Permanent Use in Shoreland Areas, 1978

Discusses rationale, problems, alternatives and model regulations for controlling the conversion of seasonal shoreland dwellings to permanent use. The major issue concerns the year round use of on-site sewage disposal systems and the increased water use anticipated by the conversion to permanent housing.

A State Water Quality Plan for On-Site Wastewater Disposal, 1979

Draft 208 Plan for On-Site Wastewater Disposal in Vermont. Includes description of studies under contract by 208 Program, description of problems and recommended solutions, and the proposed 208 Management Plan.

Septage Disposal

Septage Management Strategies for Vermont, 1978

Prepared in four parts:

1. A Statewide Overview of Septage Management in Vermont. 41 p.
2. Technical Alternatives for Septage Treatment and Disposal in Vermont. 93.p.
3. Legal and Institutional Perspectives on Septage Management in Vermont. 43 p.
4. Septage Management in Vermont: Case Studies and a Statewide Strategy. 55 p.

Septage, What Vermont Should Do About It, 1978

A summary report, for the general public, of the 208 Project, "Septage Management Strategies for Vermont". Printed in booklet form, the topics include homeowner septage problems, the septage hauler, safe disposal of septage, responsibilities of local and state government, and recommendations to decision makers. 22 p.

A State Water Quality Plan for Septage Management, 1978

Final 208 Plan for Septage Management in Vermont. Evaluates state septage management problems, reviews septage studies contracted by the 208 Program. Includes an evaluation of options considered and the proposed 208 Management Plan. 9 p.

Backroads Erosion

Erosion and Sedimentation Problems as They Relate to Vermont Backroad Construction and Maintenance, 1978

Assessment of backroads erosion in Vermont, including discussion of evaluation process, roles of district highway engineers, and town road commissioners, state agency concerns, existing data, and recommendations. 23 p.

The Vermont Backroad Handbook: Maintenance, 1978

Discusses rationale for developing a backroad maintenance program, budget considerations, and public relation considerations. Maintenance recommendations address road surfaces, resurfacing, grading, crowning, washboard, potholes, dust, road pitch, permanent vegetation, roadside ditches, culverts, inspection, stone headers, and header inlet extensions. Sources of additional help are given. 45 p.

The Vermont Backroad Handbook: Erosion Control, 1978

Includes procedures for construction and major alteration: construction plans, erosion control practices and devices, termination of work before project completion, and maintenance; vegetative erosion control methods: steps in establishing vegetation, seeding, incorporating seed into soil mulching the seed bed, tracking, grading, topsoiling, fertilization, and liming; and structural erosion controls: benching, diversions, diversion ditches, slop drains, check dams, filter berms, stilling ponds, rip-rap and stone fill, and subsurface drains.

A State Water Quality Plan for Controlling Erosion from Backroads, 1979

Draft of 208 Backroads Plan. Includes assessment of backroads erosion problem, recommendations of consultants, and an interagency agreement between the Agency of Environmental Conservation and the Agency of Transportation for establishing a backroads erosion control strategy. 7 p.

Forestry Runoff

Guides for Controlling Soil Erosion and Stream Pollution on Logging Jobs in Vermont, 1978

Pocket-sized booklet for loggers and landowners containing "Best Management Practices" in the form of non-mandatory erosion control guidelines. Also included are sections on Vermont laws and regulations affecting logging operations and sources of technical assistance. 23 p.

A State Water Quality Plan for Controlling Silvicultural Non-Point Source Pollution, 1979

Draft 208 Forestry Plan for Vermont. Includes review of forest land use and ownership patterns, evaluation of forestry non-point source pollution problems, existing management tools for timber harvesting, evaluation of considered options, results of educational pilot project, and the proposed 208 Forestry Plan. 32 p.

Agricultural Runoff

Farm Practices and Environmental Effects - A Literature Review, 1978

This report reviews past research conducted to assess the environmental impacts of selected farm practices that are likely to pollute surface or subsurface waters. Evaluation includes cropping practices, commercial fertilizer application, pesticides application, farm animal management, manure storage and application, and erosion control. The role of agriculture in water pollution is compared to other land uses. Extensive bibliography included. 108 p.

A Survey of Farm Practices in the Winooski River Valley, 1978

This report documents the extent of agricultural land management practices in the Winooski River Valley. Recommended practices and estimated costs are given, as well as programs and institutions available to assist with non-point source pollution. 29 p.

A State Water Quality Plan for Controlling Agricultural Pollution, 1978

Final 208 plan for controlling agricultural non-point source pollution in Vermont. The plan designates the most critical watersheds, identifies conservation practices which should be cost shared to obtain water quality objectives, and designates a management agency to administer the program. 22 p.

Lake Eutrophication

Woodbury Lake Water Quality Report, 1977

Part of the Vermont Lake Eutrophication Series (Report No. 15) describing physical, chemical, and biological characteristics of the lake and the land use practices in the adjacent watershed. A series of recommendations are made to ensure the preservation of the lake's water quality. 82 p.

Model Enabling Legislation for Lake Protection Districts, 1978

Model legislation designed to facilitate the establishment of cooperative alliances between towns within a drainage basin from the purposes of coordinated land use planning, the establishment of guidelines and the application of rehabilitation monies. The rationale is to provide a linkage between various towns, state, and regional agencies to encourage complementary rather than conflicting roles in lake protection.

Vermont Lay Monitoring Manual, 1979

A manual, developed in conjunction with the Vermont lay monitoring program, designed to assist monitors with their sampling activities. The booklet includes sections on water quality parameters, data interpretation, sample collection techniques, sampling instructions, data reporting, and the necessary equipment. 29 p.

Joe's Pond Water Quality Report, 1977

Part of the Vermont Lake Eutrophication Series (Report No. 14) describing physical, chemical, and biological characteristics of the lake and the land use practices in the adjacent watershed. A series of recommendations are made to ensure the preservation of the lake's water quality. 80 p.

Lake Elmore Water Quality Report - Addendum, 1978

Part of Vermont's Lake Eutrophication Series (Report No. 5) includes information on phosphorus loading, shoreland soils, shoreland zoning and a questionnaire completed by lakeshore residents. 9 p.

Wasteload Allocation

Otter Creek Wasteload Allocation Study, Part A: Report of Data, 1979

Presentation of hydrologic and physical data, and water quality analysis for the 1977 and 1978 assimilative capacity studies. 99 p.

Otter Creek Wasteload Allocation Study, Part B: Mathematical Modeling Report, 1979

Discussion of water quality relationships in streams and quantification of such relationships. The water quality model used by Department of Water Resources is presented with the calibration and verification for Otter Creek. Sensitivity analysis of model parameters included. Status - Draft report complete by May 1979.

Lower Winooski River Wasteload Allocation Study, Part A: Report of Data, 1979

Presentation of hydrological and physical data, and water quality analysis for 1975, 1977, and 1978 assimilative capacity studies.

Upper Winooski River Wasteload Allocation Study, Part A: Report of Data, 1979

Interim report - presentation of data for 1978 assimilative capacity study.

Sludge

Municipal Sludge Metals Analysis - Interim Report, 1979

Preliminary findings of the metal concentrations of municipal sludge from Burlington's three sewage treatment facilities. Includes a description of sampling and testing procedures, sampling data from both sludge and wastewater nutrient analysis, land application rates, sludge management regulations, and a literature survey. 25 p.

Miscellaneous Reports

A Curriculum Guide to Water Quality Education, 1977

Outlines a curriculum for water quality education which is activity oriented. Includes detailed description of field trips and associated activities such as teacher and student preparation, evaluation and follow up, implementation of activities resource materials, and an in-depth bibliography of available films, slide talks, kits, games, and sourcebooks. 75 p.

Projected Land Use to 1990 for Selected Vermont Communities, 1978

Criteria for town selection, description of task, assumptions, methodology, limitations, selected towns, people contacted, and map legend. 192 p.

Vermont's 208 News (5 issues)

Bi-monthly newsletter published by Vermont 208 staff. Each issue reports on activities of the State 208 Board and District Committees, featuring a "theme" article on some technical aspect of the program and including a calendar of meetings and a list of resources such as slide shows and publications.

Audio-Visual Materials

Farm Practices Slide-Tape Presentation

Backroads Slide-Tape Presentation

Forestry Runoff Slide-Tape Presentation

Lake Eutrophication Film

VERMONT

WATER QUALITY STANDARDS

Vermont Water Resources Board

effective March 7, 1978

VERMONT
WATER QUALITY STANDARDS

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STATE OF VERMONT

AGENCY OF ENVIRONMENTAL CONSERVATION

WATER RESOURCES BOARD

VERMONT WATER QUALITY STANDARDS - REGULATIONS GOVERNING WATER CLASSIFICATION AND CONTROL OF QUALITY

Introduction

In accordance with the provisions of 10 V.S.A. 905 (a) (12), the Vermont Water Resources Board has adopted the following regulations governing the classification of the State's waters and for the control of their quality. It is important to note that the classification of specific waters of the State in accordance with the Vermont Water Pollution Control Act (10 VSA, Chapter 47) and these regulations does not necessarily represent a description of the existing condition or quality of the waters involved, but rather a water quality objective. The water classification process is, therefore, a management tool used for both planning purposes and in evaluating whether or not to permit specific discharges and if permitted, the degree of treatment necessary to make that discharge compatible with the water quality objective of the receiving body of water.

These regulations shall be known as the Vermont Water Quality Standards. The Vermont Water Quality Standards are composed of four parts: General Policy (Part I), Classification of Waters (Part II), Discharges (Part III), and Procedure (Part IV). If any provision of these regulations is held invalid, the remainder of these regulations shall not be affected thereby.

These regulations are intended to supersede the Regulations Governing Water Classification and Control of Quality adopted by the Vermont Water Resources Board on May 27, 1971 as amended on December 20,1973 and March 25, 1976, which regulations are amended as of March 7, 1978 the effective date of these regulations.

Any questions regarding the interpretation or meaning of the language used in these regulations should be referred to the Vermont Water Resources Board.

PART I GENERAL POLICY

RULE 1: Definitions

Whenever used or referred to in these regulations, unless a different meaning clearly appears from the context:

(1) "Act" means the Vermont Water Pollution Control Act, 10, V.S.A., Chapter 47;

(2) "Board" means the Vermont Water Resources Board;

(3) "Discharge" means the placing, depositing, or emission of any wastes, directly or indirectly, into the waters of the State;

(4) "Effluent Limitation" means any restrictions or prohibitions established on quantities, rates and concentrations of chemical, physical, biological and other constituents which are discharged into waters of the State, including schedules of compliance;

(5) "Natural Origin" means that condition which exists in the absence of any direct or indirect human activity.

(6) "Person" means an individual, partnership, public or private corporation, municipality, institution, or agency of the State, and includes any officer or governing or managing body of a partnership, association, firm or corporation;

(7) "Public Interest" means that which shall be for the greatest benefit to the people of the State as determined by the standards set forth in Section 1253 (e) of the Act;

(8) "Schedule of Compliance" means a schedule of remedial measures including an enforceable sequence of actions or operations leading to compliance with an effluent limitation, or any other limitation,

prohibition, or standard, including any water quality standard;

(9) "Secretary" means the Secretary of the Agency of Environmental Conservation or his duly authorized representative;

(10) "Waste" means effluent, sewage or any substance or material, liquid, gaseous, solid or radioactive, including heated liquids, whether or not harmful or deleterious to waters;

(11) "Waters" shall include all rivers, streams, creeks, brooks, reservoirs, ponds, lakes, springs, and all bodies of surface waters, artificial or natural, which are contained within, flow though or border upon the State or any portion thereof.

RULE 2: Policy

It is the policy of the State of Vermont that its waters be protected, managed and utilized in the public interest and that in the public interest all waters of the State shall be protected and managed so as to obtain or maintain a water quality meeting the classification standards for Class B waters as set forth in the Act and in these regulations.

RULE 3: Anti-Degradation

Certain waters of the State of Vermont are of a quality which exceeds the standards of their assigned classification. The quality of such waters shall be maintained in the public interest as provided in the Act and in these regulations. To accomplish this objective after May 27, 1971, all proposed new or increased discharges of wastes to such waters must be compatible with the uses and technical requirements applicable to the assigned water quality classification and must receive the highest practical degree of treatment currently available.

In implementing this policy, the Administrator of the United States Environmental Protection Agency shall be provided with such information as that office will need to discharge its responsibilities under the Federal Water Pollution Control Act as amended.

PART II CLASSIFICATION OF WATERS

RULE 4: Water Quality Classification

In order to establish clear management objectives, the waters of the State shall be designated by Class and Water Management Type on the basis of the quality of the water to be obtained and maintained after giving due consideration to the public interest as defined in the Act and these regulations including but not limited to the consideration of public enjoyment and use, propagation of fish and wildlife and the economic and social development of the State of Vermont and the area in which the water is located.

RULE 5: Water Class - Technical Requirements

The waters of the State shall be classified in accordance with the Act as being either Class A, Class B or Class C waters and shall be protected, managed and utilized in a manner compatible with the uses and technical requirements of the designated classification.

A. Class A Waters

Class A waters are waters of a quality which is suitable for public water supply with disinfection when necessary. Character uniformly excellent.

Class A Waters

Technical Requirements

Item	Requirement
(1) Dissolved Oxygen	As naturally occurs
(2) Color	None other than of natural origin
(3) Turbidity	None other than of natural origin
(4) Coliform Bacteria	Total coliform not to exceed 100/100 ml. Fecal coliform: none attributable to the discharge of domestic or industrial wastes.
(5) Taste and Odor	None other than of natural origin
(6) pH	As naturally occurs
(7) Temperature	As naturally occurs
(8) Sludge deposits, settleable solids, solid refuse, floating solids, oil, grease and scum	None other than of natural origin

B. Class B Waters

Class B waters are waters suitable for bathing and recreation, irrigation and agricultural uses; good fish habitat; good aesthetic value, acceptable for public water supply with filtration and disinfection.

Class B Waters

Technical Requirements

Item	Requirement
(1) Dissolved Oxygen	As determined by Water Management Type in accordance with Rule 6.
(2) Color	Not to exceed 25 standard color units

Class B Waters

Technical Requirements

Item	Requirement
(3) Turbidity	As determined by Water Managememt Type in accordance with Rule 6.
(4) Coliform Bacteria	Total coliform not to exceed 500/100 ml. Fecal coliform not to exceed 200/100 ml.
(5) Taste and Odor	None in such concentrations that would impair any usages specifically assigned to this class nor cause taste and odor in edible fish.
(6) pH	6.5 - 8.0
(7) Temperature	As determined by Water Management Type in accordance with Rule 6.
(8) Sludge deposits, solid refuse	None other than of natural origin.
(9) Settleable solids, floating solids, oil, grease and scum	None in such concentrations or combinations which may reasonably be expected to impair any usage applicable to the assigned water class or which may reasonably be expected to result in thedevelopment of sludge deposits or which will hinder the objective of improving water quality. No waste containing such substances or materials shall be discharged until and unless they have received adequate and appropriate treatment.

(10) Free of pollutants that:

(1) affect the composition of bottom fauna; or
(2) affect the physical or chemical nature of the bottom; or
(3) interfere with the species composition or propagation of fishes.

C. Class C Waters

Class C waters are waters suitable for recreational boating, irrigation of crops not used for consumption without cooking, habitat for wildlife and for common food and game fishes indigenous to the region; and such industrial uses as are consistent with other Class uses.

Class C Waters

Technical Requirements

Item	Requirement
(1) Dissolved Oxygen	As determined by Water Management Type in accordance with Rule 6.
(2) Color	Not to exceed 25 standard color units
(3) Turbidity	As determined by Water Management Type in accordance with Rule 6.
(4) Coliform Bacteria	Fecal coliform not to exceed 1000/100 ml.
(5) Taste and Odor	None in such concentrations that would impair any usages specifically assigned to this class nor cause taste and odor in edible fish.
(6) pH	6.0 - 8.5
(7) Temperature	As determined by Water Management Type in accordance with Rule 6.
(8) Free of pollutants that: (1) affect the composition of bottom fauna; or (2) affect the physical or chemical nature of the bottom, or (3) interfere with the propagation of fish	
(9) Mixing Zone	Class C waters will be assigned only to receive discharges of wastes properly and adequately treated as approved and permitted by the Secretary. Any such stretches of Class C waters shall otherwise be managed as if they

Item	Requirement
	were classified as Class B waters.
(10) Sludge deposits, solid refuse	None other than of natural origin
(11) Settleable solids, floating solids, oil, grease and scum	None in such concentrations or combinations which may reasonably be expected to impair any usage applicable to the assigned water class or which may reasonably be expected to result in the development of sludge deposits or which will hinder the objective of improving water quality. No waste containing such substances or materials shall be discharged until and unless they have received adequate and appropriate treatment.

RULE 6: Water Management Types - Oxygen, Temperature and Turbidity Standards:

To provide for the protection and management of aquatic life, including but not limited to fisheries, the waters of the State shall be designated as being one of five water management types. All wastes discharged to waters of the State shall be treated in such a manner that the oxygen, temperature and turbidity levels of the receiving waters shall be maintained in accordance with the specifications of the assigned water management type.

A. Water Management Type Specifications

(1) Water Management Type I : Rivers, streams, brooks and creeks sustaining natural populations of brook trout, salmon, rainbow trout and brown trout. The dissolved oxygen content of these waters shall be not less than 7 mg/l at and near spawning areas and not less than 6 mg/l in non-spawning areas. The normal seasonal, daily and diurnal variations above these dissolved oxygen limits shall be maintained.